STEEL
The Metalworking Weekly
A PENTON PUBLICATION
DECEMBER 25, 1961

Researcher Carl F. Schaefer of AC Spark Plug tells why . . .

Ceramics Gain New Stature 50

Don't Overlook Byproduct Profits . . . 24

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Reeves Steel gets top quality product, record output from Wean Galvanizing Line

The quality reputation of Reeves TiteKote® galvanized steel—and Reeves finished galvanized products—is well established. Produced by the Reeves Steel and Manufacturing Division of Empire-Reeves Steel Corporation on a 36" Wean line, TiteKote's excellent quality derives from both the outstanding operating practices of Reeves personnel and dependability of the equipment.

Installed at the Reeves Mill in Dover, Ohio in 1955, the Wean line has given trouble-free service since start-up. The Wheeling-type line handles gauges from 16 to 30, top speed on the lighter materials being 310 fpm. Strip from 18" to 36" wide in coils up to 26,000 lbs. is fed to the line after annealing and a temper pass on a two-high mill.

Wean's experience in continuous processing line design and construction has been built over 31 years service to the steel industry. Wean's "creative engineering" can make a major contribution to expansion or modernization of your finishing facilities.

WEAN

THE WEAN ENGINEERING COMPANY, INC. • WARREN, OHIO

some companies shouldn't buy steel from us

(They should buy from a steel service center.)

What companies? Those who use steel in small or moderate lots.

When they buy steel from a mill and keep it in inventory, they also buy all the "costs of possession" that go along with that inventory. Cost of capital. Of storage space . . . insurance . . . handling. Of accounting . . . scrap . . . taxes . . . obsolescence.

But when they use the large stocks of their service center as their own, they reduce or eliminate those "costs of possession." And those savings can more than offset the few cents more they pay for service-center steel.

Don't get us wrong. We want to sell Bethlehem steel products. If you buy steel in small or moderate lots, your service center can nearly always show you how you can save money by buying Bethlehem steel products from them. Service centers from coast to coast stock top-quality Bethlehem structurals, sheets, plates, bars, tool steels, and alloy steels.

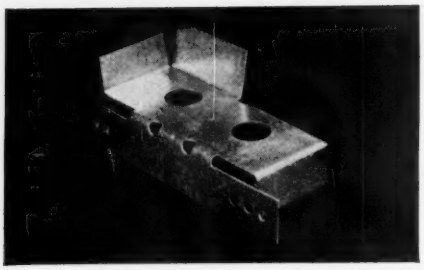
Steel

. . . For strength
. . . economy
. . . versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

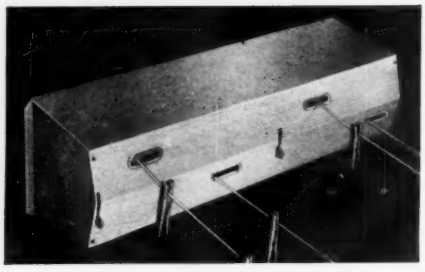
BETHLEHEM STEEL

BETHLEHEM STEEL

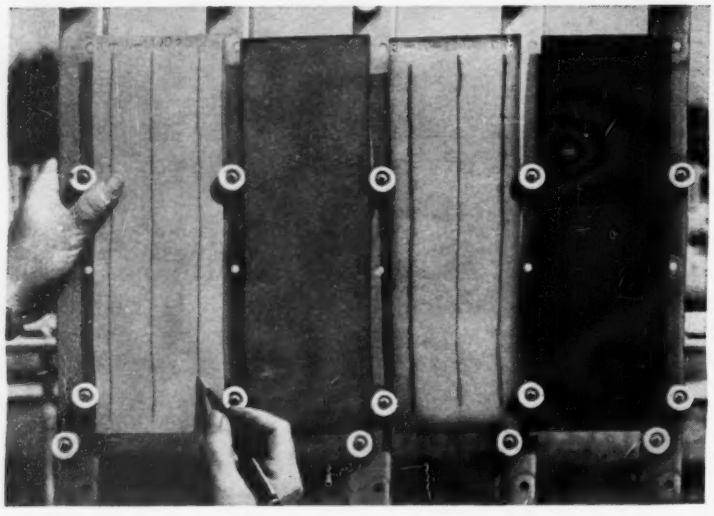


Armco ZINCGRIP Steel

Armco ALUMINIZED STEEL Type 2



5 Armco Coated Steels Can Help



Armco ALUMINIZED STEEL Type 1

This label identifies modern, dependable steels in your products

After 3-years' exposure outdoors, paint holds tightly to ZINCGRIP A, PAINTGRIP (far left). No rust even where scratched. No rust on the unpainted sample, either (second from left). Samples on the right are phosphate-treated cold-rolled steel, one painted, the other unpainted. Paint has suffered. Rust is evident on the unpainted sample.

1. NEW ARMCO ZINCGRIP® A, PAINTGRIP®. This *new* kind of hot-dip zinc-coated steel is specially prepared to take a paint finish that's every bit as attractive as a paint finish on cold-rolled steel! It's *spangle-free*, holds paint *tighter and longer*, permits *twice as many spot welds* as ordinary galvanized before electrode tips need redressing. It's available *now* in commercial quantities.

2. ARMCO ZINCGRIP STEEL has a tightly adherent zinc coating that gives products durable protection at an *average cost of about 2⅓ cents per square foot.* Savings: About .92 cents per square foot over typical cost of painting. The door part pictured, for example, was previously fabricated from cold-rolled steel, then painted for protection. It is now made of Armco ZINCGRIP at a significant saving.

3. ARMCO ALUMINIZED STEEL Type 1 means greatly increased service life—for mufflers and other consumer, commercial and industrial products menaced by heat and corrosion. Furnace, heater and appliance parts made from this special hot-dip aluminum-coated steel won't discolor to 900 F, won't scale under 1250 F. Reflective parts bounce back up to 80% of radiant heat, remain strong.

New steels are born at Armco

You Fight Costs and Competition

They combat corrosion, solve heat and painting problems.

4. ARMCO ALUMINIZED STEEL Type 2 offers exceptional resistance to outdoor corrosion. In a mild industrial atmosphere, for example, its hot-dip aluminum coating outlasts the coating on unpainted commercial galvanized steel sheets 4-to-1. It reflects heat, too. The manufacturer of the "vanishing clothesline" casing in the photo cites *savings of 30%* in switching from aluminum to Armco ALUMINIZED STEEL Type 2. The reason: ALUMINIZED STEEL permitted reduction in metal thickness without loss of strength. It also assured greater resistance to damage. Ideal for construction products exposed to the weather.

5. ARMCO COLD-ROLLED PAINTGRIP and low painting costs go hand-in-hand. Over a mill-applied electrolytic zinc "flash" goes a paint-holding film. You simply fabricate and paint immediately. Sheets resist rusting in storage, take severe fabrication.

Armco Division
Armco Steel Corporation
1901 Curtis Street, Middletown, Ohio

SEND DATA ON

- ☐ New Armco ZINCGRIP A, PAINTGRIP
- ☐ Armco ALUMINIZED STEEL Type 1
- ☐ Armco Cold-Rolled PAINTGRIP
- ☐ Paint Savings with Armco ZINCGRIP
- ☐ Armco ALUMINIZED STEEL Type 2

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"Fitness report" with hundreds of identical copies

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Superior Tube Co. \
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Union Steel Corp. \
Van Huffel Tube Corp. /
Wall Tube & Metal Products Co. \

\ PRODUCES WELDED STAINLESS STEEL TUBE
/ PRODUCES WELDED CARBON STEEL TUBE

261

Here's the reason why you can count on welded carbon or stainless steel tubing in critical heat transfer applications: its method of manufacture, developed to high domestic standards, results in consistently reliable performance. Starting with clean, scale-free flat rolled steel the resulting tube surfaces are smooth, and free from scratches and pits. You are assured of concentricity, exact O.D. and I.D., precise wall thickness, and uniform ductility for bending or rolling in operations.

Whether you require carbon or stainless steel analyses, listed here are the quality welded tube producers ready to serve you. It will pay you to contact any of them or write for free Booklet 8591, Department ST-7, Welded Steel Tube Institute, Inc., Hanna Building, Cleveland 15, Ohio.

WELDED STEEL TUBE INSTITUTE, INC.

Belated Present

Santa will be delivering STEEL's special Christmas gift to you one week late. On Jan. 1, most of our 1962 metalworking yearbook issue will be devoted to a study of how to stop "technertia" (coined from technology and inertia). Our definition: Slowness to adopt new technology.

U. S. industry suffers from the malady. On the average, ten years elapse between the laboratory and production stages of a major idea.

Technological improvements can help metalworking curtail price fighting, contain employment costs, and meet foreign competition. That's why next week's issue will be devoted to a study of how to move ahead faster in industrial science.

Incidental Intelligence

Item: Metal helmets to protect workers in dangerous places have been around at least since 1585. Architect Domenica Fontana used the hats then when he was moving and re-erecting the Vatican Obelisk at St. Peter's Square.

Puzzle Corner

We believe the correct answer is 50.99018 ft to the chipmunk puzzle of Dec. 11. Unfortunately, the chipmunk has been at our answer book and chewed up the pertinent page. Learned counsel advise us that the answer involved finding the hypotenuse of a triangle whose legs are 50 and 10 ft long. The first in with that answer was Robert A. Mason III of Dudgeon, Taylor & Bruske Inc., Detroit.

Here's another tough one: A man 6 ft tall walks around the equator. How much farther does his head travel than his feet?

Accolades

Geraldine keeps showing us letters. To keep peace with our night editor, we'll mention two:

Writes R. B. Davidson, special assistant to the president, Weber Showcase & Fixture Co. Inc., Los Angeles: "We are making a study . . . and have found the article, 'What You Should Know About Belgium,' in the July 10, 1961, issue of STEEL, p. 47, very useful. If articles of this nature have been published on other countries . . . please send us reprints." They have. The latest was on Nigeria, Dec. 11, p. 57. More will be coming, all authored by International Editor George Howick.

William W. Lundell, staff assistant to the president of Motec Industries Inc., Hopkins, Minn., says (in reference to our numerous stories about government procurement): "Your writers do such a thorough job of research, have so succinct a style, and are so timely that it is both pleasurable and profitable to read your excellent magazine."

Once There Were Ten

We picked up the stanzas below from *Americana*, published by American Metallurgical Products Co. Inc. in its house organ. It's authored by our old friend, Anonymous.

Ten price cutters, cutting all the time,
One cut too much, then there were nine.
Nine price cutters, feeling kind of great;
One forgot his overhead, then there were eight.
Eight price cutters, looking up to heaven;
One took a credit risk, then there were seven.
Seven price cutters, thought they couldn't mix;
One quit the Association, then there were six.
Six price cutters, all still alive;
One cut the price again and now there are five.
Five price cutters, crying out for more;
One forgot to pay his bills, now we have four.
Four price cutters, all full of glee;
One gave some rubber checks, now we have three.
Three price cutters, don't know what to do;
One met a lower price, now there are two.
Two price cutters, a cuttin' by gum;
One cut the other's throat, now we have one.
One price cutter, left without a penny;
He couldn't cut any more, now we haven't any.

We wish we had seen those lines last April when STEEL published its impact issue on price fighting. Additional copies, incidentally, of that and our other impact issues are still available. Others published to date cover foreign competition, utilization of people power, and automation. You can also get copies of our next (Jan. 1). Single copies cost $2. Prices for larger quantities can be obtained on request. Write Reprint Department, STEEL, Penton Bldg., Cleveland 13, Ohio.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Coming

Jan. 1

IN

STEEL

Let's Overcome TECHNERTIA

Technertia is coined from two words—technology and inertia. Our definition: Slowness to adopt new technology.

American industry suffers from technertia. On the average, ten years elapse between the laboratory and production stages of a major idea.

Technological improvements can help metalworking reduce costs, improve quality, and better compete in domestic and world markets. That's why STEEL's Metalworking Yearbook issue, Jan. 1, will be devoted to a study of how to move ahead faster in industrial science.

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Published every Monday by
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...Fluid Power news

World's largest injection molding machine OILGEAR equipped

Report No. 12,202 From Oilgear *Application-Engineering* Files

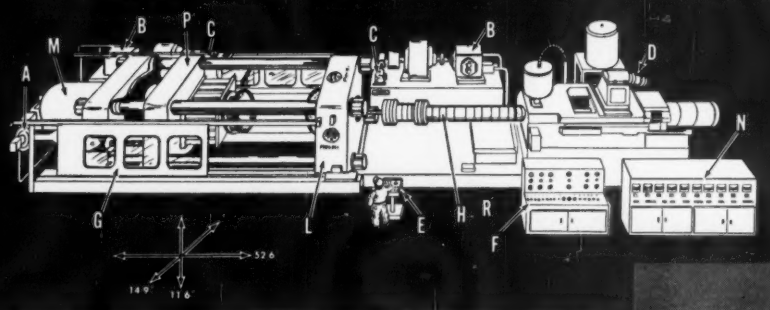
How OILGEAR-MEIKI design teamwork perfected Fluid Power and Control System for the world's largest, in-line, screw-injection, plastics molding machine.

Hitachi, Ltd., Tokyo, Japan — User
Meiki Co., Ltd., Nagoya, Japan — Machine Designer and Builder

PROBLEM: To design and build a hydraulic-powered molding machine for single-shot injection molding of the largest amount of thermoplastic material ever attempted. Provide sufficient mold area to produce large electrical appliance components.

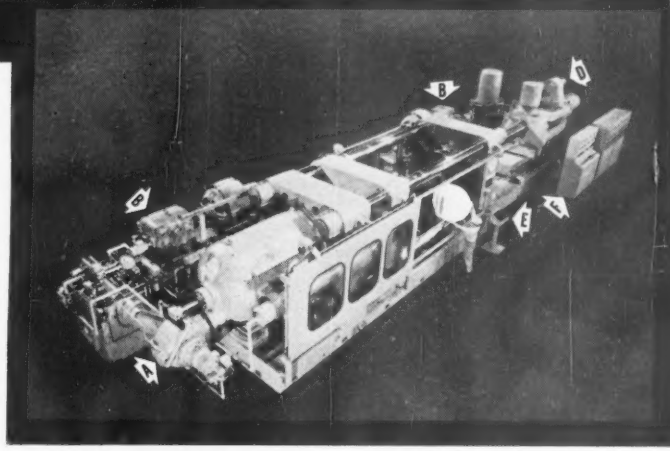
REQUIREMENTS: 1. Direct injection capacity of 1,100 ounces (68 lb) of polystyrene per shot. 2. Accommodate a mold 53 9/16" wide, 82 11/16" high, and a minimum of 55" thick. 3. Straight hydraulic clamping unit with 126" daylight opening, 71" stroke, 2,500 tons force — and remotely controlled adjustable speed up to 485 ipm, with automatically controlled slow-down for smooth closing and opening. 4. Adjustable hydraulic injection speeds up to 285 ipm. 5. Variable speed hydraulic drive on 6" feed screw — from 0 to 38 rpm — with torque up to 20,000 lb ft. 6. Semi-automatic, and manual pushbutton cycle control from a remote console. 7. Precision control of speeds and pressures. 8. Positive interlock, and smooth, shockless operation of all functions. 9. Heavy-duty, durable, efficient hydraulic components for continuous, dependable, high-speed operation.

OILGEAR Application-Engineered Fluid Power and Control Systems for the Meiki SJ-150 "Screw-Ject" Injection Molding Machine. MEIKI



A — Oilgear solenoid pilot operated 12" surge (prefill) valve. **B** — Oilgear heavy-duty, electrohydraulic servo-controlled, two-way, variable delivery pumps. **C** — Oilgear heavy-duty constant delivery pumps. **D** — Oilgear motor. **E** — Remote control console with Oilgear preset units. **F** — Centralized control panel for hydraulic pressure and speed control with Oilgear preset units. **G** — Motor-driven safety doors — both sides. **H** — 10-zone independently controlled heaters. **L** — Deflection-free stationary platen. **M** — 2,500-ton clamping cylinder. **N** — Temperature control panel. **P** — Movable platen. **R** — Rotating device for injection unit.

SOLUTION: Cooperation and teamwork between Meiki engineers specializing in molding equipment — and Oilgear engineers specializing in Fluid Power applications — made the world's largest injection molding machine a huge success. After being demonstrated at the Tokyo World's Fair, the machine is now in production at Hitachi, Ltd. Two of Oilgear's newest heavy-duty electrohydraulic servocontrolled, two-way, variable delivery pumps with automatic pressure unloading devices supply Fluid Power for . . . adjustable, high and low-speed opening and closing of clamping platen . . . driving Oilgear heavy-duty motor on plasticizing and injection screw . . . charging auxiliary accumulator in injection ram system . . . operating injection ram at variable speeds. Small Oilgear heavy-duty constant delivery pumps operating at pressures to 3,300 psi provide positive clamping force, and shift and turn the injection unit. Oilgear solenoid pilot operated surge (prefill) and direction control valves perform auxiliary functions. Through push-buttons and Oilgear preset units on the remote control console, operator can select — rapid advance clamp ram speeds to 485 ipm . . . clamp ram slowdown speeds to 80 ipm . . . injection ram speeds to 92 ipm with one pump — to 184 ipm with both pumps — and up to 285 ipm using the accumulator . . . slow clamp opening speeds to 80 ipm . . . fast clamp opening speeds to 460 ipm. When holding pressure for curing, control automatically reduces pump stroke and power input to a point just sufficient to maintain the required pressure. The Oilgear motor-driven injection screw shaft runs continuously to keep molding material under constant shear or agitation for more uniform heating, melting, bubble-free injection — and lower injection pressures and clamping forces.



On Meiki's entire line of injection molding presses, hot plate presses, forming presses and die casting machines, the "byline" is *Fully Automatic — Fully Hydraulic* with OILGEAR quality Equipment . . . *for the lowest-cost-per-year!*

For practical solutions to YOUR rotary or linear drive and control problems, call the Factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . . . .

THE OILGEAR COMPANY

Application-Engineered "Any-Speed" Drive and Control Systems
1572 WEST PIERCE STREET • MILWAUKEE 4, WISCONSIN
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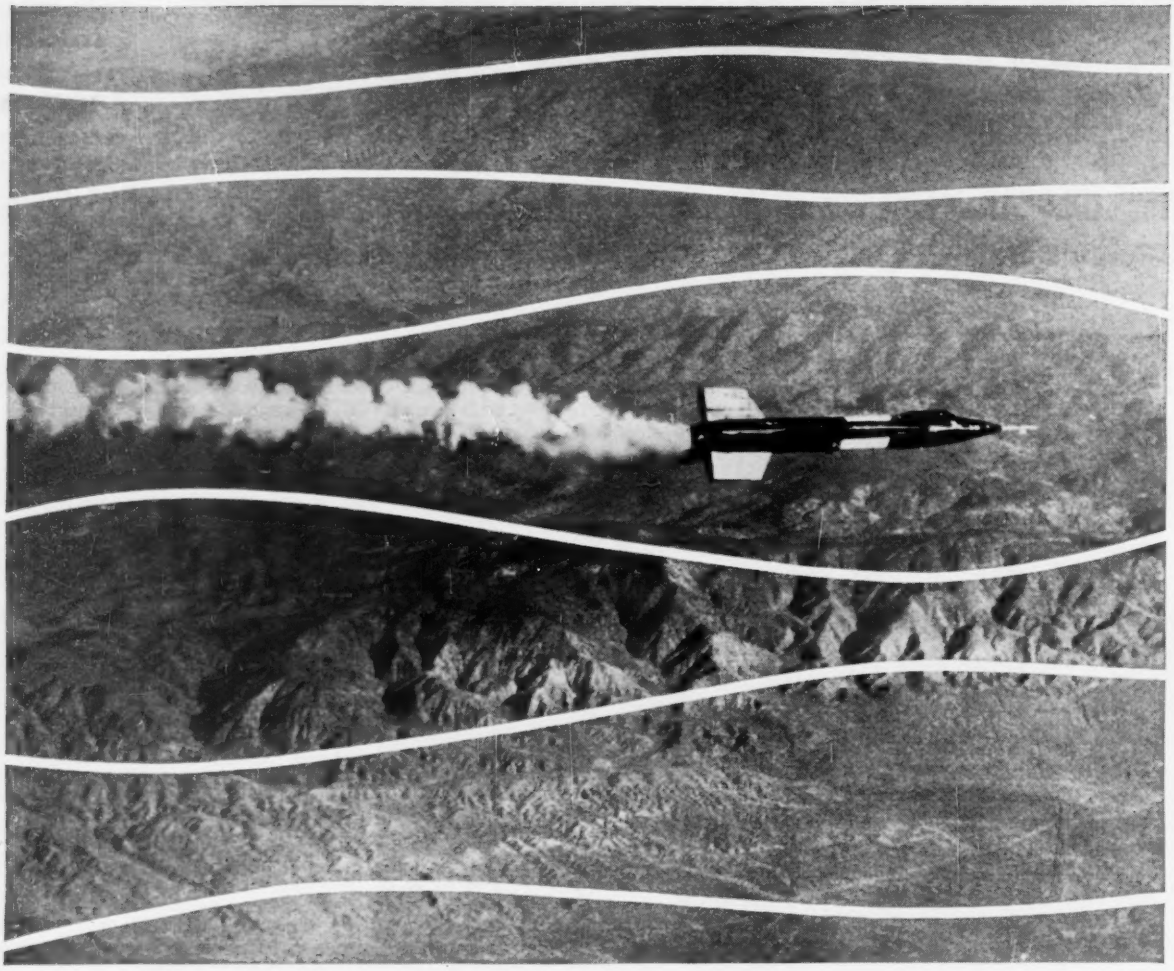


For the star-chasing X-15

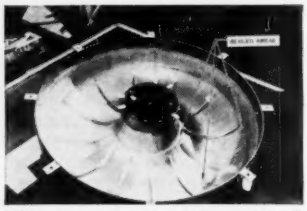
SCOTCH-WELD® SOLVES FUEL FLOW PUZZLE, SEALS PRESSURE BULKHEADS TO 3,700 PSI

BRAND STRUCTURAL ADHESIVE

One of the design puzzles North American had to solve before its X-15 could rocket into space: effective sealing of fuel tanks. Ammonia, one of the liquids which fuel the Mach-busting X-15, is carried in a compartmented tank of Inconel riveted to aluminum. Segmented bulkheads must be perfectly sealed or the fluid will not flow from one compartment to another. Of the many sealants tested, only SCOTCH-WELD Brand Structural Adhesive Film produced the seal required in the face of ammonia, other cryogenic fluids, and the extreme temperature and pressures encountered.

SCOTCH-WELD adhesives have hundreds of applications—wherever there's a problem of fastening or sealing metal to metal, or to other materials. They resist ozone, acids, water, jet fuels, other corrosives. And provide shear strength of plus 3,700 psi at 70°F., 1,650 psi at 300°F. They contain no solvents—fume disposal and drying problems don't exist! The same 3M research that created these SCOTCH-WELD adhesives can help solve the fastening problems that may be plaguing you. Why not ask your 3M Field Engineer? Or write AC&S Division, 3M Co., Dept. SBEE-121, St. Paul 6, Minn.

"SCOTCH-WELD" is a reg. TM of 3M Co.



Wherever the riveted metals of the tank meet, a SCOTCH-WELD adhesive seal provides continuous contact between mating surfaces, acts as a continuous insulating barrier of uniform thickness.

ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Quality plus economy
when you buy
SUMITOMO
steel wire rods

Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

LEADING PRODUCERS OF STEEL WIRE RODS, PIPE AND ROLLING STOCK PARTS

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CALENDAR
OF MEETINGS

Jan. 8-12, Society of Automotive Engineers Inc.: Annual engineering congress and exposition, Cobo Hall, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: Joseph Gilbert.

Jan. 14-17, Institute of Scrap Iron & Steel Inc.: Annual meeting, Statler Hilton Hotel, Washington. Institute's address: 1729 H St. N.W., Washington 6, D. C. Executive vice president: William S. Story.

Jan. 15-17, AIME Minnesota Section and University of Minnesota: Annual iron ore mining symposium, Hotel Duluth, Duluth. Contact: Fred E. Berger, director, Center for Continuation on Study, University of Minnesota, Minneapolis 14, Minn.

Jan. 15-19, Steel Plate Fabricators Association: Annual meeting, Mountain Shadows Hotel, Scottsdale, Ariz. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 17, Engineers Joint Council: Annual meeting, Biltmore Hotel, New York. Council's address: 345 E. 47th St., New York 17, N. Y. Secretary: L. K. Wheelock.

Jan. 17, Metallurgical Society of AIME: Mechanical working conference on flat rolled products, Pick-Congress Hotel, Chicago. Society's address: 345 E. 47th St., New York 17, N. Y. Secretary: R. W. Shearman.

Jan. 18-19, National Industrial Conference Board Inc.: General meeting, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Jan. 22-23, Industrial Heating Equipment Association Inc.: Annual meeting, Drake Hotel, Chicago. Association's address: 2000 K St. N.W., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 22-25, Plant Engineering & Maintenance Show: Convention Hall, Philadelphia. Contact: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 23-24, American Society of Tool & Manufacturing Engineers: Prototype and short run tooling seminar, Barringer Hotel, Charlotte, N. C. Society's address: 10700 Puritan Ave., Detroit 38, Mich. Executive secretary: Harry E. Conrad.

Jan. 23-24, Steel Shipping Containers Institute Inc.: Meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 28-31, Truck-Trailer Manufacturers Association Inc.: Annual meeting, Palm Springs Hotel Riviera, Palm Springs, Calif. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.

Jan. 28-Feb. 1, Associated Equipment Distributors: Annual meeting and exhibit, Conrad Hilton Hotel, Chicago. Association's address: 30 E. Cedar St., Chicago 11, Ill. Executive secretary: P. D. Herman.

Jan. 29-30, National Association of Purchasing Agents: Office Buyers' Group, workshop seminar, Hotel Roosevelt, New York. Contact: Robert F. Ames, U. S. Steel Corp., 71 Broadway, New York 6, N. Y.

Jan. 30-Feb. 2, Society of Plastics Engineers Inc.: Annual technical conference, Penn-Sheraton Hotel, Pittsburgh. Society's address: 65 Prospect St., Stamford, Conn.

Feb. 4-7, American Institute of Chemical Engineers: Meeting, Statler Hilton Hotel, Los Angeles. Institute's address: 25 W. 45th St., New York 36, N. Y. Secretary: F. J. Antwerpen.

Feb. 5-9, American Society for Testing & Materials: Committee week, Statler Hilton and Sheraton-Dallas Hotels, Dallas. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Thomas A. Marshall Jr.

Feb. 6-8, Material Handling Institute Inc.: Spring meeting, Hilton Inn, Atlanta. Institute's address: 1 Gateway Center, Pittsburgh 22, Pa. Managing director: L. West Shea.

Sales of Durables, Inventories on Upswing

In a survey of manufacturers, the Commerce Department reports: Sales and inventories of durable goods will rise in the first quarter of 1962, continuing the upswings started in the second and third quarters . . .

(In billions, seasonally adjusted)

	1961				1962
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr
Sales	$40.2	$43.4	$44.8	$46.3	$47.2
Inventories	30.3	30.2	31.1	31.7	32.3

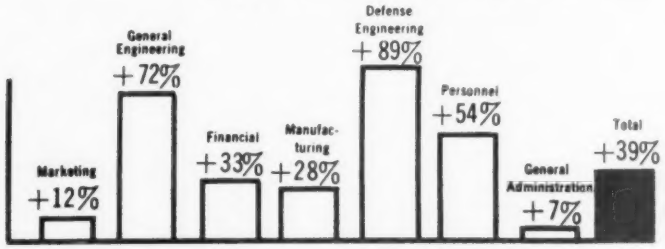
CF&I Bets on Construction to Spur Steelmaking

Leonard C. Rose, president, Colorado Fuel & Iron Corp., predicts steel production next year will surpass that of 1961 by as much as 15 per cent. He believes increased construction activity will be a key factor. CF&I will introduce a major new product—wide flange beams—next year. A staple of the construction industry, the beams will be produced in facilities which are under construction—part of the firm's $21 million plant modernization program, says Mr. Rose.

Demand for Executives Rises Sharply

Demand for executives climbed sharply in the three months ended Nov. 30 compared with activity in the year ago period, says Heidrick & Struggles. The Chicago employment firm also reports that demand was 13 per cent higher in the September-November period than it was in the three months ended Aug. 31. The company bases its studies on the number of "help wanted" ads placed in newspapers.

Percentage of Change in Demand Sept.-Nov. 1961 from Sept.-Nov. 1960



Office Equipment, Computers Register Big Gains

Sales of office equipment and computers in 1962 should be 10 to 12 per cent above this year's, says Prentice-Hall Inc. "Profits will do even better," P-H adds. New orders rose more than 30 per cent in September and October,

and they are expected to continue climbing through the first half in 1962. Computer sales rose 25 per cent in 1961, and a 30 per cent gain appears likely next year.

Wholesale Prices Hold Firm

Despite a strengthening economy, prices have not shown any inflationary signs. The Federal Reserve reports that the wholesale commodity price index held steady in late November and early December. Prices of most industrial commodities were unchanged although there were upturns in steel scrap, lead, and zinc.

Private Construction May Be Losing Zip

Private construction has been going great, but a bearish note is sounded by James C. Downs Jr., chairman, Real Estate Research Corp. He believes decisions to build may decline for these reasons: "All the accepted statistics clearly indicate a decrease in space needs and a more uncertain climate for investment. Vacancies are up; rents are on the weak side of stable; operating costs and taxes are increasing steadily; and financing charges are well above their ten year average. Only one factor (upgrading accommodations, which is motivated by record personal income and the drive for competitive advantage) is as strong or stronger than it was at the start of recent years."

Companies Turn to Byproducts as Profit Producers

"A comprehensive research organization cannot be restricted to the narrow confines of present company interest. It would strangle the creative thought which it is our job to encourage," warns Dr. S. W. Herwald, vice president-research, Westinghouse Electric Corp. Researchers, given freedom to roam, are turning out an unprecedented number of inventions. If the items don't fit normal product lines or markets, companies are turning to merchandising byproducts—and doing it profitably. See the story on Page 24.

Ceramics Gain New Status

Ceramic materials affect metalworking beneficially (in combinations with metals) and adversely (as competitors). They are available in a broadening range of properties, thanks, in part, to new manufacturing techniques. For the latest information on their properties and applications, see Page 50.

Australia Uncovers Huge Iron Ore Deposits

Discovery of a vast new iron ore field in West Australia, probably as large as 2500 million tons, has been announced by Senator Spooner, minister for development. Mining men believe the deposits may be of fantastic proportions. They point out that the announcement is based on the findings of only two of 87 exploration leases granted to Australian and overseas companies last July. The West Australia government is completing a contract for the export of 15 million tons of iron ore to Japan.

The 100th U. S. Trade Mission

The trade mission slated to arrive in Burma on Jan. 29 will be No. 100 sent out by the U. S. Commerce Department to beat the bushes for business in foreign lands. The missions carry proposals of U. S. firms with them. If you have a proposition, contact your local Commerce Department field office.

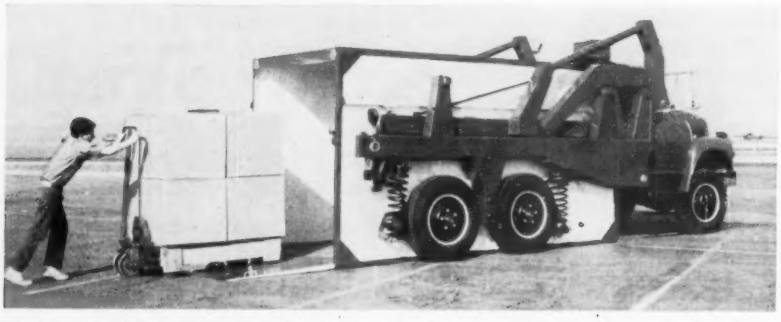
Blind Inspectors Check Close Tolerances by Ear

A blind inspector at Timken Roller Bearing Co.'s Canton, Ohio, plant places a bearing cup on a standard, calibrated gage. The gage is connected to an electronic device which emits varying tones to tell the inspector if the cup is acceptable, undersize, or oversize. Normally used to indicate a tolerance of 0.0005 in., the device permits measurements to 0.000025 in. Blind personnel have been employed at Timken plants since 1943, and the firm says that with the aid of electronic devices they are among its most efficient inspectors.

Inco, Sears Swap Ideas on Marketing

Officials of International Nickel Co. Inc. and Sears, Roebuck & Co. met last week to discuss the impact of metallurgical progress on retail merchandising. Inco presented Sears a metals library containing design and technical data for reference use in connection with consumer goods. In return, Inco received "a better idea of just what customers desire in their metal products," said F. L. LaQue, vice president.

Transport System Solves Loading Problems



Techno Products Inc., Cleveland, has developed a truck and transport system employing interchangeable cargo containers and a vehicle which can quickly load or unload from ground level or heights up to 5 ft.

Military Surplus Auction Set for January

Fifteen million dollars worth of military surplus equipment and materials will be auctioned on Jan. 30-31 at the Sheraton-Chicago Hotel, Chicago. Items include wood and metalworking equipment, construction equipment,

STEEL The Metalworking Weekly

December 25, 1961 Vol. 149 No. 26

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345 E. 47th St., New York 17, N. Y.

fork lifts, air compressors, railway equipment, barges, and floating cranes. Catalogs are available from: Consolidated Surplus Sales Office, Area 12, Department C, Rock Island Arsenal, Rock Island, Ill.

Incentive Program Pays Off for Lincoln Electric

William Irrgang, president, says Lincoln Electric Co., Cleveland, paid $7.7 million in incentive pay and fringe benefits in 1961. A $6.4 million cash bonus was shared by 1345 employees in terms of their performance ratings. Selling prices of the company's welding machines and electrodes are still below 1934 levels (when the incentive program was started) despite 300 per cent increases in steel and copper prices and labor rate increases of more than 450 per cent, reports Mr. Irrgang.

Strike Ends at GM of Canada

After a 48 hour strike of 16,000 workers, General Motors of Canada and the UAW reached an agreement. One big stumbling block: A boost in pensions. The new agreement provides an employee with 31 years' service a pension of $141 a month (vs. $84 before).

Straws in the Wind

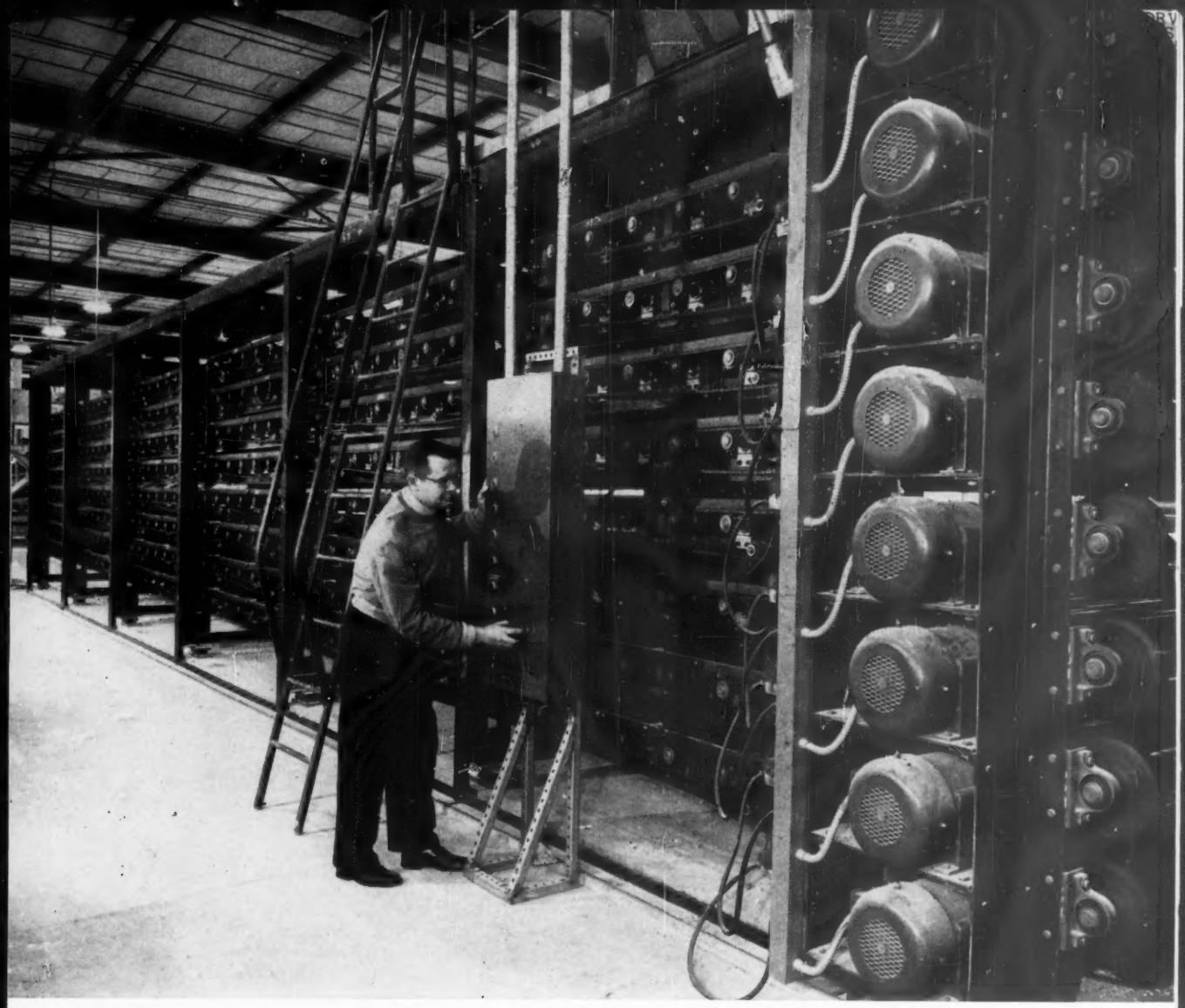
Local 393 of the UAW ended a strike against Trailmobile Inc., accepting an offer of 42.3 cents an hour (including 18 cents in wage increases) over a three year period . . . Aluminium Ltd. and two Nigerian development finance groups have formed Alcan Aluminium of Nigeria Ltd. to build an aluminum rolling mill at Port Harcourt in Africa's most populous nation . . . Production and sales of heat exchanger equipment should rise at least 11 per cent during 1962, says American-Standard Industrial Div., American Radiator & Standard Sanitary Corp. . . . Dollar volume of typewriter exports may increase as much as 25 per cent next year, forecasts the Commerce Department. Imports will rise too, but an increasing proportion will be U. S. models manufactured abroad.

Metalworking Pulse

The Business Trend: In the final week of full production for 1961, STEEL's industrial production index came within 3 points of matching the all-time record of 185 (1947-49=100). **Autos:** Elimination of Saturday scheduling for the long holiday weekend caused output to drop from its near record pace. Schedules are expected to rise again after the holidays. **Steel:** Production is being pushed steadily higher by increasingly heavy orders for finished products.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49 = 100)
  Week ended Dec. 16 .... 182†
  Year ago 151
  Details on Page 41
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Dec. 23 . 150,000*
  Year ago 114,941
  Details on Page 38
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Dec. 23 2,230,000*
  Week ago 2,200,000
  Details on Page 70

†Preliminary. *Estimated.



Century motors provide continuous operation for oven conveyor

Eight Century 2-horsepower, squirrel-cage, totally-enclosed-fan-cooled motors accelerate materials onto an 8-deck feed-in conveyor at precise feed-in speeds.

At the end of this conveyor system is an oven. Materials must enter this oven at continuous speeds, and materials must be delivered to the oven constantly during each plant shift. A comparable 8-deck conveyor system is at the other end of the oven to remove the baked materials for cooling and stacking.

These eight Century motors assure the continuous flow operation pictured here. Top-quality Century motors provide the dependability required for long hours of stop-start operation.

Your Century sales and application engineer, a full-time motor specialist, can help you choose the right motor for your needs from Century's full line of from 1/20 to 400-horsepower motors. Just contact him or your authorized Century motor distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

60-12

Snowplow chews up avalanches at 36 tons a minute

How steel with Nickel in it delivers the brawn behind the bite

Chewing through mountainous drifts to rescue a snow-bound town, this plow can devour 2,200 tons of snow an hour.

It bites through solid ice and deep snow. Or strips a new-fallen six-inch blanket from a superhighway at 30 mph.

Drive shaft and gears run a gauntlet of shocks as the plow churns through rocks and stumps buried under stone-hard snow. That's one big reason why two nickel alloy steels, AISI 4320 and 3140, are used for these heavily stressed transmission parts.

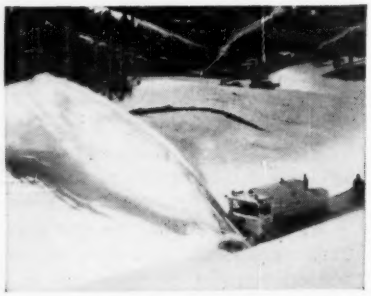
Nickel gives steel the strength and toughness essential to a snowplow's drive shaft that must perform under brutal wrenching, twisting shock loads in arctic cold.

Putting stamina where it counts is just one of the things you can do with Nickel. In addition to providing muscle, Nickel can also help alloys withstand the intense heat generated by supersonic flight. Or shrug off the deep cold of liquid helium. And every industry knows the value of Nickel in combatting corrosion.

When you have a metal problem, look into the possibility that Nickel or one of its alloys might be the answer. Write for our "List A." It tells you of technical literature helpful to all industries. A copy is yours on request.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street INCO New York 5, N. Y.



Transmission shafts are made of AISI 4320 nickel alloy steel. Drive and spline bushings are AISI 3140. Snowplow by American Snowblast Corp., Denver, Colorado.

INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

December 25, 1961

Ground Operations

The scene was Miami International Airport. We were part of an angry group holding return tickets on the 4 o'clock flight to Cleveland. We had just been told the airline had no record of our existence, that there was no assurance we could get on the flight for which we were ticketed, and that we would have to be "wait listed." It was Saturday afternoon; we were 1100 miles from home and pretty unhappy.

In our irritation, we couldn't help but remember that the same airline had "bumped" us three times in a row at Hartford when we held confirmed tickets for flights from Boston to Cleveland.

We wondered why an airline that spends millions to put the finest possible equipment in the air (equipment that is manned by skilled and competent personnel) could goof up so royally on the ground.

We are still wondering. But as we calmed down a bit, we had to recognize another fact of life. Many businesses and many industries are burdened by somewhat comparable "ground operations."

We have known metalworking companies whose engineers designed superior products, whose production departments manufactured to high quality standards, whose marketers were skilled and aggressive. But the company lost sales because a telephone operator was discourteous, or because a receptionist continued to file her nails while answering a customer's inquiry, or because a clerk messed up a billing.

We are intimately acquainted with publishers who make every effort to produce a good magazine and then have someone antagonize readers by addressing them incorrectly by name or by title.

And who isn't acquainted with the service organization that promises the repairman will be there on Monday, but he arrives on Thursday.

Such goofups may not be considered too important in the grand perspective. But they are the people peevers. They can alienate customers and lose sales.

We recall a study made by a Western gearmaker. The company wanted to find out why a hundred customers had been lost: 68 said they drifted away because of the supplier's indifference; 14 said they had unadjusted grievances; only 14 were lost because of price or dissatisfaction with quality or design.

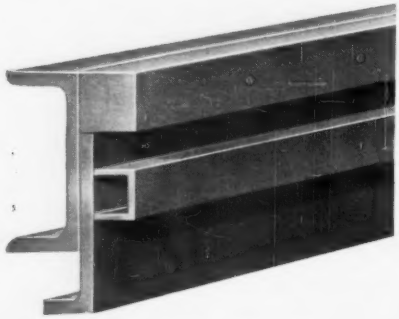
Maybe it's time to take a look at our "ground operations."

Walter J. Campbell

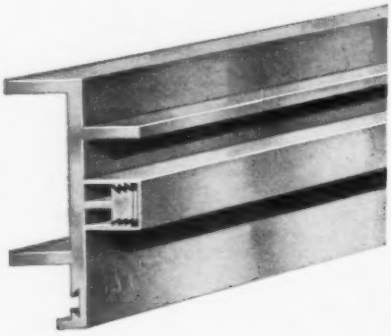
EDITOR

VIEWS OF EDITOR V THE EDITOR VIEWS

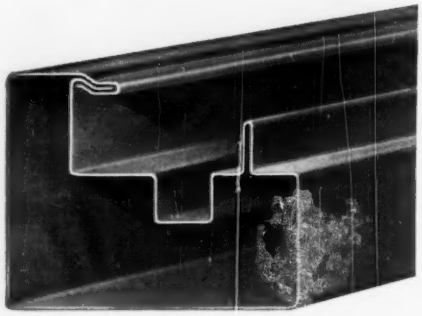
Have your components



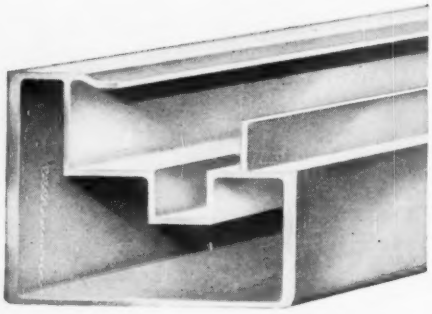
BEFORE: four standard shapes assembled to form a complex unit.



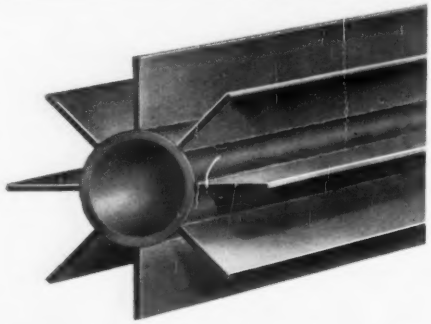
AFTER: two extruded shapes snap into place, saving time, eliminating fasteners.



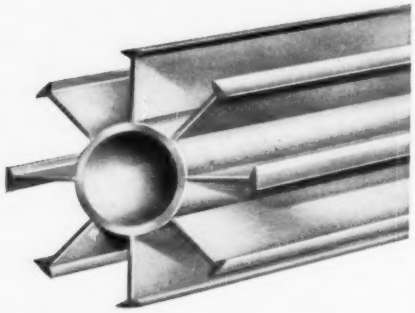
BEFORE: a roll-formed steel sheet.



AFTER: a stiffer, stronger aluminum extrusion with closer dimensional accuracy . . . design flexibility . . . and lower costs.

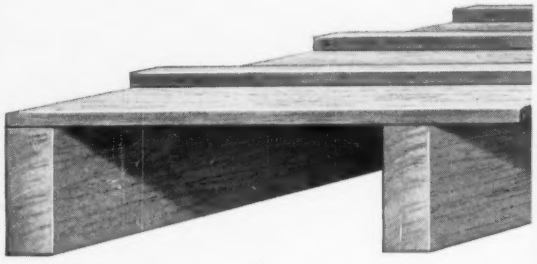


BEFORE: a labor-consuming soldered copper assembly.

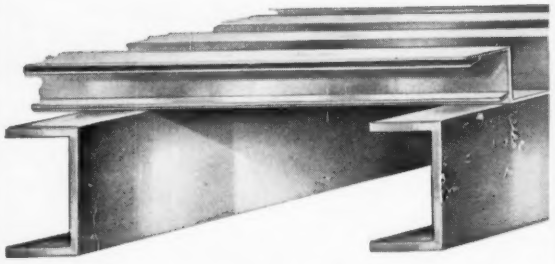


AFTER: a finished aluminum extrusion that is far less costly, lighter, stronger, and produced to closer tolerances.

had their yearly checkup?



BEFORE: friction rails . . . deck . . . cross-beams . . . all of wood.



AFTER: extrusions of light, low-cost, rot-proof, splinterproof aluminum do the job. Hollow rails make cooling or heating easy.

More and more companies have consulted extrusion specialists . . . and switched from rolled, crimped, welded, machined or assembled parts to cost-cutting aluminum extrusions.

Have an independent extruder analyze your product line right away—and regularly from now on. The chances are excellent that he can help make major cost savings.

Production techniques and aluminum alloys have improved rapidly over the last few years. That is why it takes a specialist—an experienced extruder—to keep up with all of the many cost-saving possibilities that aluminum extrusions now offer.

It's always good business to know your nearby independent extruder . . . a specialist supplied with top-quality aluminum ingot by Aluminium Limited.

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Supplying metal and ideas to companies that work with aluminum

ALUMINIUM LIMITED

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Please send me a list of Independent Extruders in this area.

Name_____

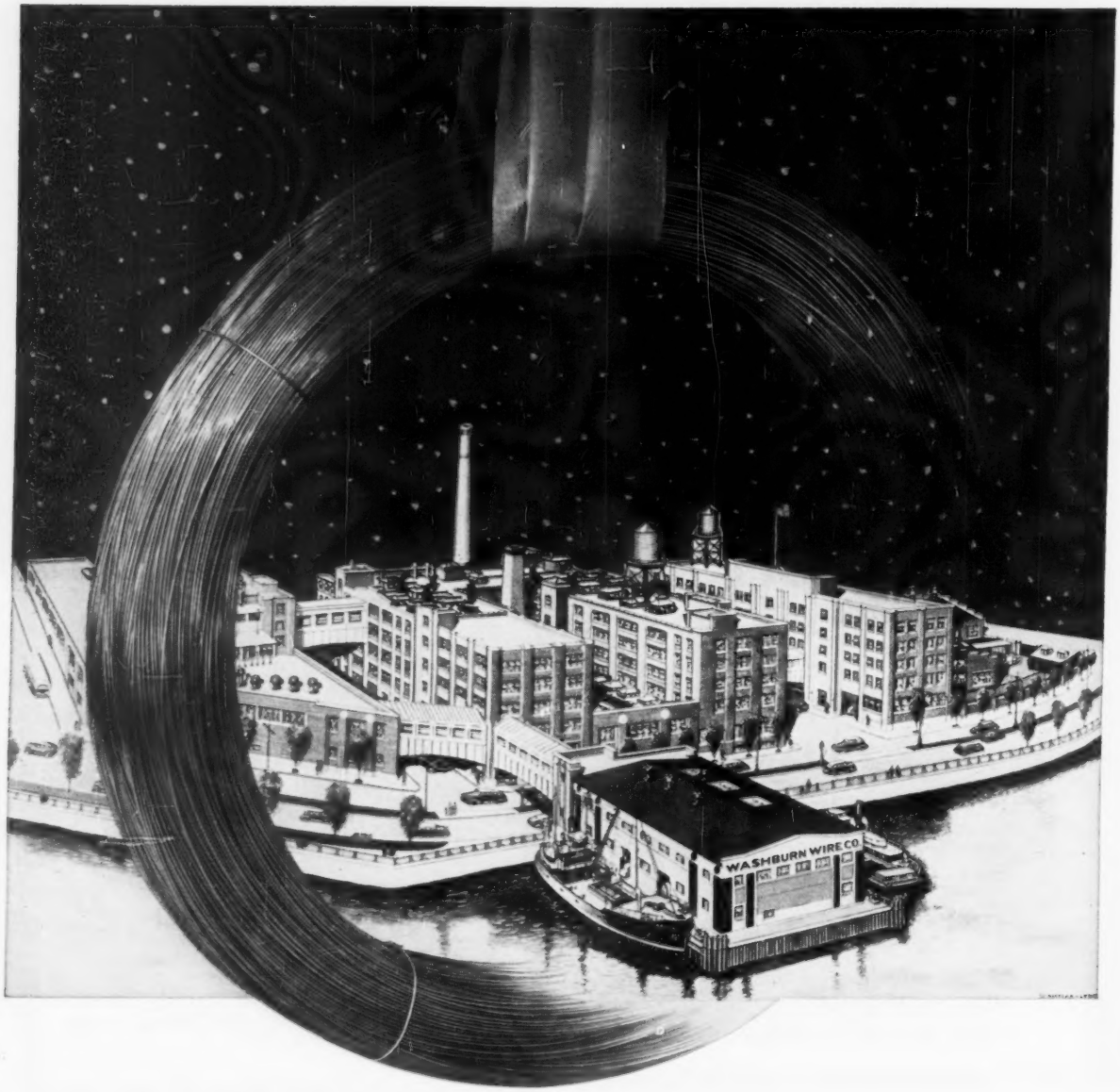
Title_____

Company_____

Address_____

City_____ State_____

ST 12



Best Wishes for a

Happy New Year

WASHBURN WIRE COMPANY, NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

'61 ends on bright note for metalworkers as . . .

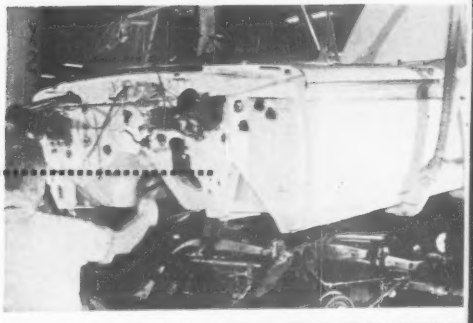
Key Consumer Items Gain Momentum

CHRISTMAS finds metalworking's stockings filled with good signs for the coming year. Two of the most promising are from the auto and appliance industries — metalworking's chief consumer outlets. Both industries are on an upswing which is expected to continue strongly into 1962.

'62 AUTO OUTLOOK
(Production increase)

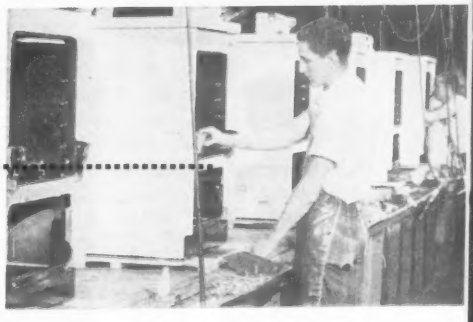
Cars . . . . 17—24%

Trucks . . . 8—10%



'62 APPLIANCE OUTLOOK

5—10% Production Increase



• **Up Autos**—"At least 1 million more automobiles are expected to be produced in the U. S. in 1962 than in 1961," says the Commerce Department. "Automobile production is expected to total 6.4 million to 6.8 million—an increase of 17 to 24 per cent." Truck producers are shooting for 1.2 million units compared with about 1.1 million this year.

• **Up Appliances**—"We expect the current favorable sales trend in the appliance industry to continue into 1962, making next year a better one than 1961 by possibly 5 per cent," says Herman F. Lehman, general manager, Frigidaire Div., Dayton, Ohio, General Motors Corp. Mr. Lehman's forecast may be somewhat conservative. A survey by the Institute of Appliance Manufacturers, Washington, indicates that most producers look for the improvement to run 5 to 10 per cent, while some estimates range as high as 25 per cent.

Joseph S. Wright, president, Zenith Radio Corp., Chicago, states: "We feel that the combinations of the replacement demand, increases in family formations, expanded income, and willingness to buy will lead to a 5 per cent increase in sales of black and white television receivers."

• **Up Confidence**—Both autos and appliances are key factors in the economic picture, and the significant improvement forecast for them will undoubtedly do much to spur optimism in other quarters. High rates of auto and appliance production will influence spending decisions on industrial commodities, consumer goods, and capital equipment.

• **Up Economy**—Aside from the psychological impetus they provide, the two key industries have a direct bearing on a large segment of the economy. Autodom is said to be the largest industrial user of steel, rubber, glass, and upholstery leather. Appliances, accounting for one-tenth of cold rolled steel sheet usage, have averaged $4 billion in retail sales over the last five years. In addition to the thousands of persons on auto and appliance maker payrolls, employees of suppliers, service agencies, and sales operations will take home fatter paychecks next year. They will, in turn, lead to more spending potential.

In recent years, auto and appliance production has followed the same path as the U. S. economy. Both segments have sufficient momentum to pull a big share of 1962's economic load.

Don't Let Small Orders Make You A Year 'Round Santa Claus

Tips for Buyers

1. Make cash payments, or wherever possible "meet the minimum."
2. Cut down on paperwork by combining several small orders on a single invoice.
3. Consolidate all orders given by purchasing department personnel.
4. Study "rush orders" or frequency of similar items, and place orders periodically.
5. Standardize as much as possible. "Specials" cost more—for the buyer and the seller.
6. Don't expect quantity prices on single item purchases.
7. Set up a short-order form to be used against a six month blanket purchase order.
8. Educate department personnel on comparative costs of processing large vs. small orders. (A $1.50 order may cost you $3 in paperwork.)
9. Watch frequency of emergency orders. It may mean insufficient inventories.
10. Whenever possible, pick up small orders and pay by cash or check.

How to Attack Small Order Costs

"IF YOU SAY small orders are no problem, then you are just not interested in your costs! You're probably playing Santa Claus year 'round."

So says the sales manager of a big Eastern metalworking firm, who like many purchasing executives, suppliers, and distributors are wrestling rising costs. Their lament: For both buyer and seller, small orders usually cost as much for selling, bookkeeping, and processing as large orders and it's not unusual for some small order handling costs to total more than the items ordered.

• **New Procedures** — A departure from conventional ordering methods for industrial buyers, but gaining favor with a number of companies, is the use of a purchase order with a detachable check. A bonded driver-expediter picks up orders locally and pays for supplies with net value up to $300. This system is working "exceptionally well" for Falk Corp., Milwaukee, Wis., reports Harvey Lewis, assistant to the director of purchases.

Carrier Air Conditioning Co., Syracuse, N. Y., is cutting purchasing costs through use of petty cash, "small buy blanket orders," and better inventory control, says Victor H. Donovan, general purchasing agent.

"We mail a copy of a requisition to a supplier, which he uses as a purchase order, and he invoices us once a month against the requisitions he has received during the previous month," says V. deP. Goubeau, vice president-materials, Radio Corp. of America (Camden, N. J.).

• **Diverts Small Lots** — Aluminum Company of America last month announced that orders for standard size sheet and plate in quantities of less than 2000 lb would be diverted away from its mills and into its distributor outlets.

Richard A. Sweet, Alcoa's general manager-distribution, says the move is expected to: 1. Make a wide variety of aluminum products and services more readily available to all users. 2. Relieve Alcoa's mills of uneconomical small orders.

• **Space Age Requirements** — "In procurement, the small order problem is becoming more and more acute," says J. L. Leppla, director of procurement, Aeronautical Div., Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. Mr. Leppla

Tips for Sellers

1. Take paperwork shortcuts: Eliminate acknowledgements; use handwritten order forms with several carbon copies for all internal use.

2. If you establish minimum, service, or broken package charges, carefully explain your policy to customers.

3. Consider reducing sales commissions on small orders.

4. Eliminate direct promotion and advertising costs on lines or customer classes particularly plagued with small orders.

5. Ask customers to consolidate requisitions into larger orders. Dissuade customers from spreading their orders too thinly among too many suppliers.

6. Hold small orders for consolidated deliveries.

7. Greater use of parcel post and common carriers on small orders may be cheaper than your delivery truck.

8. Reduce free delivery zones, or establish delivery charges.

9. Suggest standard stock items, where possible, for customers ordering specials.

10. Employ a "key line" program to emphasize selling volume lines to volume customers.

gives this reason: "Leadtimes for our products are shortened and production volume of any one system or device gets smaller." To ease the problem, his company has:

- Combined engineering and production components buying into one section.
- Placed responsibility for buying a particular type of component or commodity with a single buyer.
- Established minimum stocks of certified material with local distributors in order to fill short requisition orders with minimum effort and paperwork.
- Continued automation of "mainstream" paperwork in order to maintain the company position as customer delivery requirements became more severe.
- Written purchase agreements with suppliers covering small orders without severe price penalty where the company was able to forecast significant annual requirements of components.

"The initiation of a value engineering program should have an indirect impact on the small order problem," Mr. Leppla adds. "Value analysis of new or existing devices will lead to elimination of parts, as well as use of standard parts."

• Size of Distributors' Problem—A recent survey by the National Industrial Distributors Association shows that almost 40 per cent of the distributors' lines of billing were for values under $5. Another 26 per cent were for values under $15.

"That's 66 per cent of the average distributors' lines of billings, which, according to profitability analysis, are almost certainly handled at an operating loss," says Robert C. Fernley, executive secretary of the association. A joint industry committee is studying the problem.

"We are promoting a concept of 'customer possibility' in our operation," says R. K. Allison, vice president, Industrial & Textile Supply Co., Charlotte, N. C. "This effort is aimed toward securing profitable orders and minimizing our interest in serving small orders." The firm has also established minimums.

Wiles I. Stray, treasurer and general sales manager, Charles A. Templeton Inc., Waterbury, Conn., tells how a San Francisco distributor handles minimums: "The company had conspicuous signs at its city counter announcing minimum charges from $10 down to $2." I asked, "Are there any exceptions to your posted minimum charges?" By the time they finished telling me what the exceptions were, they may just as well have removed the signs.

"No one has been able to explain the process by which you convince your trade that all of their small orders should go to your competitors and all of the large ones to you."

Conversely, small orders for standard stock items are a part of our service center business, says Omar V. Greene, general sales manager, Carpenter Steel Co., Reading, Pa. Small orders, requiring special manufacture, do present a problem at the Carpenter mill. However, our salesmen try to learn why a customer places such an order and if it will be a repetitive item.

On the other hand, Carpenter Purchasing Agent Robert P. Freehafer depends upon distributors to "carry a portion of our inventory—especially off-the-shelf items."

• Helpful Formula — Steel Service Center Institute distributes a cost analysis guide for steel purchasers, which offers an answer to this question: "What's your real cost of possession for steel?"

The invoice price of steel placed in inventory is only the first cost, the report states. The money you pay to "inventory" or "possess" steel is as real and as measurable as the invoice price, it is said. The institute recommends: "When all costs are considered, analysis will reveal that in many instances the cost difference between buying from steel mill sources or from steel service centers either disappears entirely or narrows to an insignificant amount."

ARE YOU BYPRODUCT ORIENTED?

• Are all your departments alert to byproduct possibilities?

Some companies have liaison men who operate between research and other departments to search out and follow up ideas for byproducts.

• How much emphasis does your product planning group put on byproducts?

Does it accept, evaluate, and develop ideas that come from, or fall outside its normal interests. Idea generators are often discouraged because no one will listen to ideas—let alone develop them.

• Are researchers encouraged to pursue ideas outside of regular company lines?

Most research directors emphasize that creativity can be stifled if research is restricted solely to solving company problems. Today's tangential probe of a material, product, or process may turn up tomorrow's profit producer.

• Do you have procedures for screening byproduct ideas?

Many firms check out a product's potential at departmental and divisional levels, then submit the idea to a top corporate level for final evaluation.

• Is your patent department geared to byproduct development?

Some patent departments catalog patents by uses and status. Periodically, patents are checked for other uses, updated, or redrawn to keep patent rights from expiring. Deferred or unpatented inventions are also reviewed for new applications.

• Are you prepared to license other companies to handle manufacturing and sales?

You need someone who understands the intricacies of licensing. He must keep in touch with possible licensees and know their interests and capabilities in engineering, production, and marketing.

Don't Overlook Byproduct Profit

AN INDIANA farmer spreads slag on his fields to neutralize soil acidity. A doctor straps a small, inexpensive, oxygen consumption meter on a patient during a basal metabolism test. A toolmaker adds heat to a dry mixture in a mold; the compound liquefies, then quickly hardens to the exact shape of the die mold.

What do they have in common? Those men are utilizing byproducts —the tools, processes, and products that are frequently the unexpected or unintended results of research. A byproduct may emerge from a scrap heap, spring to life in the fertile mind of a researcher, or find its parenthood in necessity. Whatever the origins, companies are turning to fuller development of byproducts as increasingly important profit producers.

"Most major companies produce a wide variety of inventions unintentionally. While a unique idea may solve a company's design or production problem, it often is not marketed because the idea is foreign to the sales policies and product line of the company. Getting such 'secondary' inventions into use at a profit to the inventor is an important objective of ours." Those words come from J. R. Walchli, manager, product planning department, NaVan Products Inc., El Segundo, Calif., a subsidiary of North American Aviation Inc.

• **Research Spur**—"In our present economy," says J. L. Atwood, president of North American, "research investments are producing new products faster than conventional marketing methods can introduce them to industry and consumers. We believe the problem is not to

bring more production into being, but to bring new products into production faster." Four years ago, NaVan was created expressly to commercially market inventions—North American's and others. "This year, NaVan expects about $1.7 million in sales from its own organization in addition to income from licensing," says Pat Bales, NaVan's vice president and general manager.

Other companies report similar developments. Boeing Co., Seattle, has set up Boeing Associated Products (BAP) to handle byproducts on a full time basis. More than 70 items are in the company's by product inventory and are being offered for license or other business arrangement. The list ranges from miniaturized, electronic, medical instruments (that Boeing developed for space medicine research) to food for space travelers (a white flour made from algae which could be grown on a spacecraft).

Westinghouse Electric Corp., Pittsburgh, has more than 600 scientists on its central research staff. From them, come the company's future product lines and inventions not related to Westinghouse's marketing areas. "A comprehensive research organization cannot be restricted to the narrow confines of present company interests . . . it would strangle the creative thought which it is our job to encourage," comments Dr. S. W. Herwald, vice president for research.

• **New Venture**—To fully capitalize on licensing potentials of inventions not planned for manufacture in its divisions, Westinghouse established the Invention Utilization Dept. at its Research & Development Center. "On a corporate basis, licensing income now runs well above $1 million a year," says John D. Hallenberg, manager of the new organization. In his catalog are a process for continuous compaction of powdered metals, a ride stabilizer system for automobiles, a pocket sextant, a variety of materials, test devices, instruments, and even an automatic water-closet flusher.

"The licensing program encourages inventors to submit ideas, even though the concepts are unrelated to company programs," says Mr. Hallenberg. "From the company's standpoint, it also makes better use of the scientist's time and creative effort." He also points out that the new department in no way overlaps the normal operations of the company's Patent Dept., saying: "It's really complementary."

Whatever the aims of the by-product groups—marketing, making, or licensing—each stresses organization.

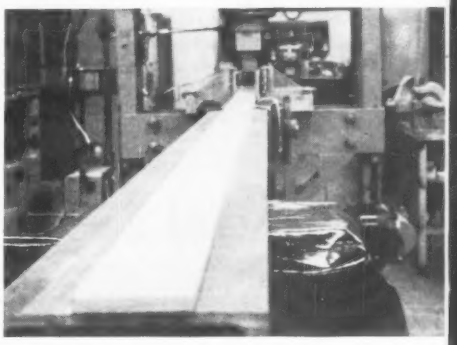
• **NaVan's Approach**—The number of ideas submitted underscores the requirement for a well run unit. In a single nine month period, NaVan's Product Planning Dept. reviewed 702 ideas and developments; 450 originated in North American's divisions; 252 came from outside. Of the total, 45 were sufficiently interesting to NaVan to merit serious research. During that process, 13 were disqualified. Of the remaining 32, 16 are being promoted for licensing, 3 have been licensed, 2 are being sold by NaVan, 8 are still in research, and 3 have been withdrawn because a deal couldn't be made.

"Emerson was wrong," comments Mr. Bales. "The world does not beat a path to the door of the man who invents a better mousetrap. We say, 'It takes more to sell a new idea than to have it.' To get anything new made and used demands salesmanship of a high order from start to finish." All NaVan's executives have had extensive sales experience. The company performs only marketing functions. Every effort is made to avoid direct involvement in engineering and manufacturing activities.

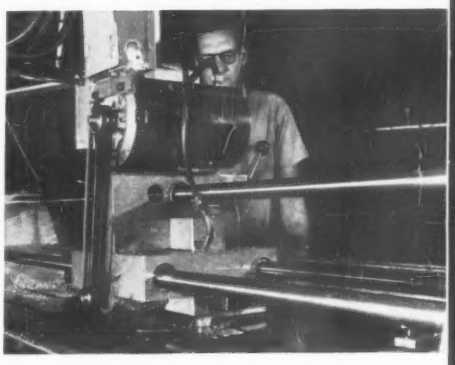
Mr. Walchli's department screens all inventions submitted to NaVan. "Our advice to any inventor is 'see a patent attorney—then NaVan,'" he says. On a no fee basis, the company investigates inventions in terms of its own interests and does not advise inventors about the worth of their ideas. Though there is no commitment to research items, NaVan has developed special techniques for evaluating markets.

• **Ideas into Hardware**—In some cases, the rights to manufacture and sell the items are leased to other firms. NaVan maintains an active interest in the licensee, striving to assist in optimum promotion of the invention. Others are sold directly by NaVan through its 599 dis-

Instant tooling for fabricating plastic parts grew out of research efforts by Boeing Co.'s Aero-Space Div. The high strength, aluminum loaded, resin material, called Veritool, holds its strength and conducts heat within tolerances of 0.0001 in. Boeing licensed making and selling rights on the dry mix



While working on a problem for another arm of the company, Westinghouse researchers developed this prototype machine for continuous compaction of powdered metals. It processes ferrous and nonferrous metals, including alloys, in ranges from bars to thin strip. The unit will be licensed



NaVan Products Inc., created by North American Aviation Inc. to commercially market inventions which originate inside and outside the company, is selling Navkut saws made in California. The traversing saw is cutting ¼ in. hardened aluminum plate. It holds a tolerance of 0.0015 in. in 26 in. of cut

From waste to profit—that's the story of slag as a byproduct. Around the turn of this century, steelmakers couldn't give away slag. In 1960, about 29 million tons were sold at $48 million. It's used in lightweight slag blocks (as shown) in cement, glass, ceramics, glass fibers, rock wool insulation, landscaping, agriculture, and construction

tributor and sales representative firms. In such cases, bids from manufacturers are obtained, mostly from small businesses.

New products are introduced by sales testing, rather than conventional market research. Samples aren't given away; they are sold against a selected cross section of the nation. "Results from sales testing are the basis of our decision to sell the item or license it," says Harry Noblitt, sales manager. "If we continue with an item, the results aid us in setting sales goals for distributors, and they eliminate much of the pioneer selling usually required by distributors in launching new products."

• **Product Diversity** — The company's marketing objectives have led to diversity in more than 100 items in its product line. Among them: Chem-Mill process, Tens-50 high strength aluminum casting alloy, Klimp fasteners for shipping containers, Navonic diamond wheels, Navkut cutoff saws, internal groove micrometers, coin dimpling device—and so the list goes.

• **Boeing's Route**—A staff of 20 people, including clerical help, takes on product evaluation, market research, industrial design, and product promotion in Boeing's BAP operation. The research and development organizations in the parent company's divisions offer byproducts to BAP. A group of BAP engineers studies each of the submissions. Then a committee makes a decision on the potential worth to BAP.

When the unit was originated a year ago, it screened 1200 inventions which had been patented by Boeing. The unit sifts 50 to 60 potential products that are turned in each month. Of those, about 10 per cent are accepted by BAP from Boeing inventors for possible sale outside the company. So far, BAP has only licensed companies to make and sell the byproducts, although other types of arrangements may be entered in the future.

• **Product Evaluation** — Douglas Aircraft Co. Inc., Santa Monica, Calif., has well over 100 products, from chemicals to advanced electronic items, under license. Douglas provides an avenue by which employees can disclose ideas they feel have market possibilities. If the employee's department head concurs that the item is marketable, the development goes through screening at the division level. If passed there, it is forwarded to the corporate product licensing function. At that point, it is reviewed with the patent department, marketing, engineering, manufacturing, and other agencies for its potential as a company product. If it looks like a worth-while addition, it is given to the product planning group. If licensing is favored, the item is referred to the product licensing function. If neither, it is returned to the agency that submitted it.

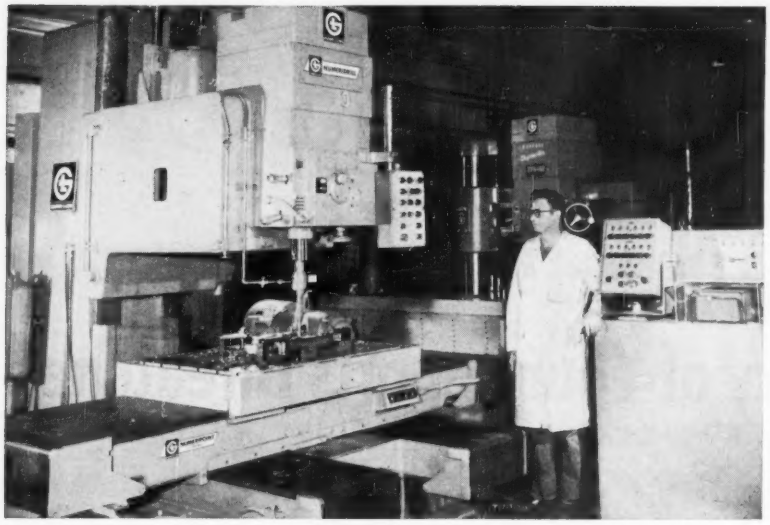
Douglas reports that more than 60 per cent of the licensed inventions, products, or processes achieve commercial success in that the potential market envisioned at the outset was achieved or surpassed by the licensee. Only a relative few are outright failures.

• **Waste to Profit**—One of the most dramatic byproduct examples can be found in the emergence of slag as an income producer. In 1909, U. S. Steel Corp., Pittsburgh, made its first commercial sale of slag. It went into road improvements in the Youngstown area, and as a fill for land reclamation. Today, about 15 per cent more slag is sold than produced (so far, it has been possible to make up the difference from stockpiles).

At U. S. Steel, slag is now a full-fledged item in the corporation's research budget. The object: Upgrade slag's chemical potential—to tailor it for more refined markets. A major portion of the slag research effort is devoted to agricultural development. Some 50,000 tons of the byproduct were sold by the industry in 1958 as agricultural liming material. Experts predict a million ton market by 1965.

In addition to the applications cited with the picture on this page, slag has been dumped in Chesapeake Bay to revitalize the oyster beds. It protects oyster eggs and newly hatched oysters from strong sea currents and sea life. In New Jersey, slag counteracted acidity in cranberries which bothered pickers and wild life. Florida citrus orchard owners are shipping low phosphorous, open hearth slag from Oklahoma. Spreading slag under the trees has cut fruit droppage by 50 per cent and raised growth rates.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*



400 Holes in 140 Minutes

A RECORD was achieved by this vertical spindle, numerically controlled drilling machine in a demonstration at Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., when it drilled 400 holes in 2 hours and 20 minutes. The ¾ in. holes were drilled in a 2½ in. thick tube sheet at more than 15 in. a minute, using a standard oil hole, twist drill.

The vertical spindle machine is one of four in a new line designed for automating short run drilling, boring, reaming, and tapping. Two vertical spindle models and one horizontal spindle model are equipped with two axis, tape controlled, positioning tables. A floor type model has tape controlled, vertical headstock travel and horizontal column travel (on a runway of any required length).

Two New Power Sources Are Developed by GE

TWO NEW SOURCES of electric power have been developed by General Electric Co.'s Missile & Space Vehicle Dept., Philadelphia.

One technique, called electrohydrodynamics (EHD), is similar to magnetohydrodynamics (MHD). The kinetic energy of a moving, ionized gas is converted into electricity by passing it through a magnetic field.

The other technique is a solar power system called STEPS (Solar Thermionic Electrical Power System). It converts the sun's energy to electric current, using a thermionic generator, and stores it in nickel cadmium batteries.

• **Gas System**—In EHD, a stream of air is ionized to produce a flow of electrons. A net output of 1.4 milliwatts at 170 volts has been generated in the laboratory. Although the phenomenon has been known for years, GE's engineers believe this is the first time that the electrical energy generated has exceeded the amount required to activate the process.

• **Sun System**—In the initial test of STEPS, it produced 12.18 watts. GE officials predict a system that will eventually produce as much as a kilowatt for every 100 lb of weight of the unit. The apparatus consists of a 195 sq ft solar collector measuring 15¾ ft (made of aluminum honeycomb with an aluminum coating), a generator composed of 105 vacuum thermionic converters, and a storage unit containing 23 nickel cadmium batteries.

• **Potentials** — Both power sources have space applications. Because of its high voltages, EHD is expected to be useful in ion engines being developed for long range space flight propulsion. GE says the EHD system will theoretically produce more power per pound at higher voltages than MHD.

STEPS is touted as a power source for manned spacecraft, lunar colonies, and in communication satellites because it is light, has no moving parts, and is efficient. Use on earth is unlikely because dust and dirt reduce effectiveness.

Wabush Lake Area Gets Pellet Plant

A MULTIMILLION dollar iron ore pelletizing plant, said to be one of the most highly automated of its type, is scheduled for completion during the spring of 1963. Its location: The Labrador section of Newfoundland at Wabush Lake.

The Carol Pellet Co.'s plant will produce 5.5 million tons of pellets (65 per cent iron content), yearly. Carol Pellet, a new company, is owned by seven U. S. firms: Armco Steel Corp., Bethlehem Steel Co., Hanna Mining Co., National Steel Corp., Republic Steel Corp., Wheeling Steel Corp., and Youngstown Sheet & Tube Co.

The plant will be operated by Iron Ore Co. of Canada, which was formed by the seven firms, plus the group of companies in Hollinger Consolidated Gold Mines Ltd. Iron Ore of Canada will supply the plant with ore from an adjacent concentrating plant, which is expected to begin production next year. Annual output of the supporting unit will be 7 million tons.

The firing and cooling sections of the pelletizing installation will be designed, furnished, and constructed by Dravo of Canada Ltd., Toronto, Ont., a subsidiary of Dravo Corp.

Congressman Lesinski has key role as . . .

Secrecy of Your Reports Threatened

THE LAW says that reports industry sends to the Census Bureau are confidential, but the Supreme Court has found a loophole. In the recent St. Regis case, it held that the law does not extend to copies of those reports held by the originating companies. But help is in sight.

Look for the administration to submit a bill early in the next session of Congress that would, in effect, reverse the high court. Its passage is predicted by a Capitol Hill source.

Rep. John Lesinski (D., Mich.) will be the man to watch in Congress. He is chairman of the Census & Government Statistics Subcommittee which will hold hearings on the measure.

The ruling in the St. Regis case came about this way. The Federal Trade Commission sought access to original reports. The Supreme Court said, "No." They are protected by law. But it made copies available to the FTC because they aren't mentioned in the law.

Both the Justice Department and FTC have sought such documents for years, particularly for use in merger cases under Section 7 of the Clayton Act. Census Bureau officials have fought the law enforcement agencies on these grounds: 1. The government has made a promise to industry that such reports will not be used for tax, investigation, or regulatory purposes, and the government can't go back on its word. 2. The whole government statistics program will be ruined if industry is not assured that its reports are confidential.

As of now, industry has a loophole: The law does not require you to keep copies of the reports. In the past, the Census Bureau asked industry to keep copies for two reasons: To expedite queries and to serve as a guide in making new reports.

Other protective measures are also possible. For example: The Census Bureau could retain all copies of your reports, or it's conceivable that you could stamp your copies "property of the U. S. Census Bureau" to keep eager FTC examiners away from your files. But those shouldn't be regarded as more than delaying tactics. If the FTC wants information, it can use subpoenas to get the data contained in confidential reports. But the FTC believes that route is too time consuming and too expensive. It seeks to establish a continuity that can be obtained only by a series of reports.

One aspect of the Supreme Court's decision worries gatherers of statistics in government: Industry may shy away from making voluntary reports which are so necessary for many programs. As one source puts it: "It's hard enough for us to get statistics now." Another source comments: "The FTC request and the Supreme Court's decision cast one great big black cloud over any promise the government makes to industry."

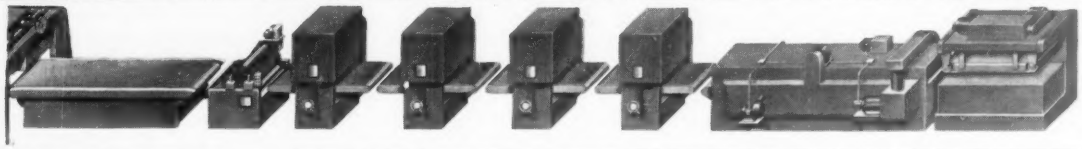
● **TAX BILL TIMING STILL SET**—Industry's reluctance to endorse the Surrey Tax Credit Plan for capital investment is spawning gossip that the administration may drop the program. Treasury Department officials strongly deny the rumor, however, and report that for the first time some solid industry support is starting to show up. The question now: Will enough businessmen start buttonholing their congressmen to show they support the Treasury position? A staffer on Capitol Hill doesn't rule out the possibility that the tax program will be shelved by the administration for "grand strategy" reasons, but he hastens to suggest that the timing problems of Congress next session have been exaggerated somewhat. For example, he figures the President's new foreign trade program might get through the House Ways & Means Committee in six weeks. A Treasury source thinks the tax package could be finished in three weeks of committee hearings, so he sees no necessity for shelving it while the trade measure is being considered.

Administration sources consider the tax package and the trade bill to be twin items. If Congress gives industry some help on tax credits for modernization, then some protectionist sentiment will be blunted. The President will argue that modernized industries will be better able to compete with imports. Thus the incentive program will be considered a part of the so-called trade adjustment program for industries distressed by foreign competition.

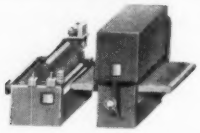
increase
stainless polishing
up to 400%

cut costs up to
75%

Carborundum conveyorized systems revolutionize stainless steel sheet polishing



Carborundum conveyorized abrasive belt machine systems increase production by as much as 400 per cent . . . cut costs by as much as 75 per cent. The through-feed operation polishes #2B stainless steel to a #4 finish in one pass, handling as many as fifteen hundred 4′ x 8′ sheets per eight hour workday. The complete system requires fewer men to produce more finished pieces in less time . . . labor savings alone rapidly pay back nominal initial equipment outlays.



low initial investment . . .

Chief components of the Carborundum system are the relatively inexpensive Model 150-BP for bottom polishing and the Model 150-CT for top polishing. With a minimum investment in one top polisher, any size shop or warehouse can polish to customer specifications from standard #2B stock. With an investment in a partial system — a bottom polisher plus two top polishers — a processor can polish to a #3 finish in one pass.

AN EXCLUSIVE CARBORUNDUM DEVELOPMENT — Both this system and its related units are exclusive Carborundum developments. These units are the only conveyorized machines available today capable of achieving such vastly accelerated production rates.

No matter what the requirements, cost savings derived from Carborundum Conveyorized Systems and system units obsolete conventional equipment.

For further information, write or telephone Carborundum Machine Division, Niagara Falls, New York.

CARBORUNDUM

WORLD MARKETS NUMBER 5

ITALY.....

ITALIANS are investing and consuming more than ever before. And Italy's employment has reached a record high while unemployment has dropped significantly.

These index figures for mid-1961, based on 1953 = 100, indicate the growth of the Italian economy:

Industrial Production	207
Manufacturing Output	210
Total Imports (c.i.f.)	258
Total Exports (f.o.b.)	356
Wholesale Prices	99
Crude Steel Production	267
Aluminum Production	156

Such striking progress is not a new phenomenon. The charts on Page 32 show that the Italian economy has been growing at a rapid rate for several years.

You can also see the size of Italy's industrial boom

Quick Facts on Italy

POPULATION—51.3 million in mid-1961.

AREA—116,228 square miles, three-fourths the size of California. Within Italy's borders lie two sovereign states: San Marino (38 sq mi) and the Vatican (108.7 acres).

CURRENCY—The Lira has an official exchange rate of 625 lire equals $1. There are coins of 5, 10, 20, 50, and 100 lire and notes of 500, 1000, 5000, and 10,000 lire.

WEIGHTS and MEASURES—The metric system is the legal standard, but some local units are used occasionally.

RELIGION—Roman Catholicism is the state religion and 99 per cent of Italians are Roman Catholics.

HOLIDAYS—New Year's Day (Jan. 1), Epiphany (Jan. 6), Day of Conciliation (Feb. 11), St. Joseph's Day (Mar. 19), Labor Day (May 1), Constitution Day (June 2), Assumption (Aug. 15), All Saint's Day (Nov. 1), Immaculate Conception (Dec. 8), Christmas (Dec. 25 and 26), and two movable religious holidays (Ascension and Corpus Christi).

COMMUNICATION—As of 1960, Italy had 3.5 million telephones in service. There were 2.1 million TV subscribers and 8 million radio and TV subscribers.

AUTOS IN USE—About 2 million.

EDUCATION—The country has more than 58,000 primary schools, 3300 secondary schools, 3250 technical schools, 522 teachers' colleges, and 27 other colleges and universities (with an enrollment of more than 200,000).

GOVERNMENT—The republic has a parliament made up of a Senate (1 representative for every 200,000 citizens) and a Chamber of Deputies (1 representative for each 80,000 citizens). The President is elected by a two-thirds vote of the Parliament, for a term of seven years.

POLITICAL PARTIES—At the center is the Christian Democratic party. At the left is the Italian Communist party; Socialism is represented by the Socialist party and the Social Democratic party. At the right are the Monarchists and the Movimento Sociale Italiano.

FOR MORE INFORMATION . . .

Italy: An Economic Profile, 1960, prepared by the Office of the Commercial Counselor, Italian Embassy, Washington, D. C.

Italian Trade Topics, a monthly publication of the Italian Embassy in Washington.

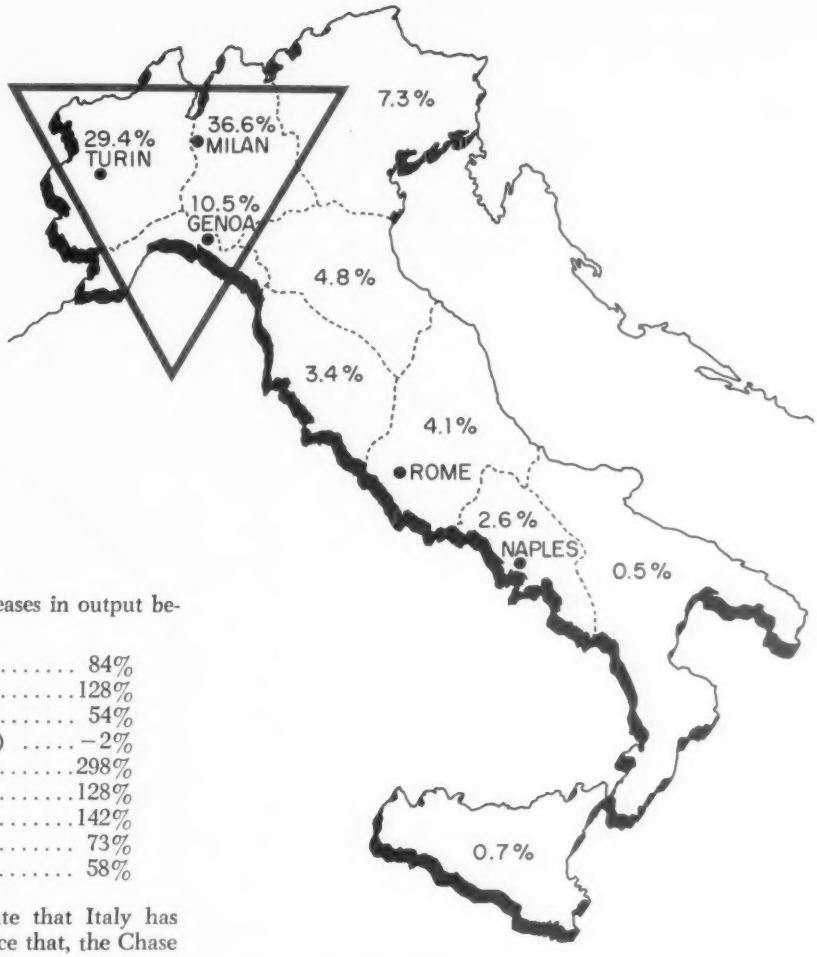
Doing Business in Italy, American Management Association, New York.

Italian Economic Survey, a publication of the Association of Italian Joint Stock Companies, Rome.

Italian Heritage (New York: Holt, 1959).

Rundt's Market Report No. 322, issued Sept. 14, 1961, by S. J. Rundt & Associates, New York 21, N. Y.

Where you find a nation's machine tools, you find the heart of its industry. In Italy, that means a triangle in the North bordered by Milan-Genoa-Turin. Better than 75 per cent of the nation's machine tools are within it. So found a 1959 survey by ISTAT, Italy's central statistical institute.



Note: Sardinia, with less than 0.1 per cent, is not shown.

by checking these percentage increases in output between 1953 and 1960 . . .

All Manufacturing	84%
Primary Metal Industries	128%
Nonelectrical Machinery	54%
Electrical Machinery (Down)	−2%
Scientific Instruments	298%
Transportation Equipment	128%
Chemicals	142%
Rubber	73%
Electricity & Gas	58%

• **Disparities**—Those gains indicate that Italy has experienced an economic renaissance that, the Chase Manhattan Bank says, "has already carried it into the front rank of the world's industrial nations." Yet Italy remains a land of contrasts. With one of the world's faster rates of growth, Italy still has the lowest per capita income in the Common Market. Although the nation is a staunch member of the North Atlantic Treaty Organization (NATO), there is a strong left-wing influence on some segments of Italian labor. And Italy's most noticeable contrast is the big gap in wealth between the North and the South. Just below Rome begins the *Mezzogiorno,* which, with Sicily and Sardinia, constitutes Italy's underdeveloped South. Two-fifths of Italy's citizens live there; they account for about one-fifth of national output. But the nation's efforts to develop that region have made it, in many ways, an attractive investment site. The standard of living there begins to show strong signs of improvement. If the area is industrialized and the living standards are raised respectably, Italy will have completed a striking rejuvenation.

• **Revival**—The nation emerged from World War II not only weakened by the conflict but also by its long period of dictatorship. Before the war, the Italian economy had been disrupted and burdened by government controls that were part of the policies of self-sufficiency fostered by the Fascist regime. During the war, Italian industry—and Italian homes—were damaged and destroyed.

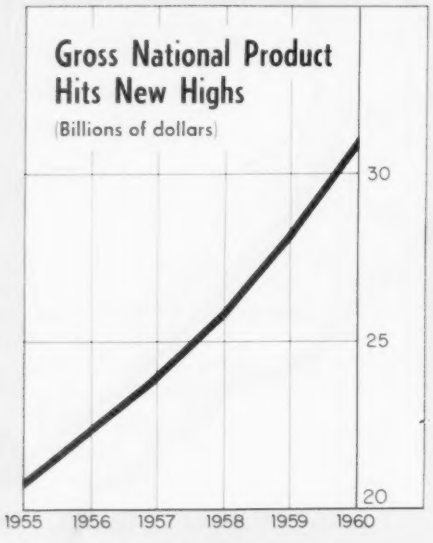
The task of rebuilding was complicated by political problems (such as a large and militant Communist Party), economic problems (such as a large number of chronically unemployed persons), natural problems (such as lack of raw materials), and problems arising from a combination of sources (such as acute inflation).

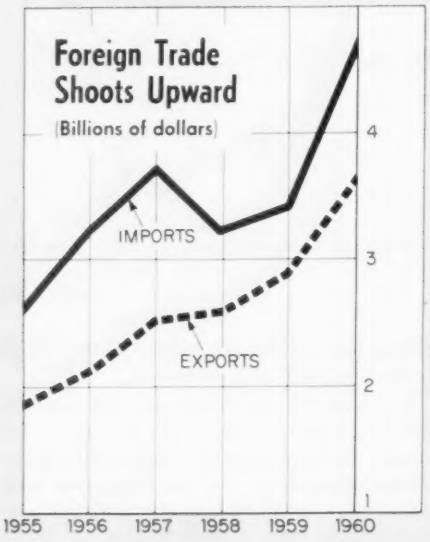
Thanks to the Marshall Plan, some belt tightening, currency reform, some long range planning, and other factors, the nation pulled through its dark hour. It can again call itself, in an industrial as well as a tourism sense, "sunny" Italy.

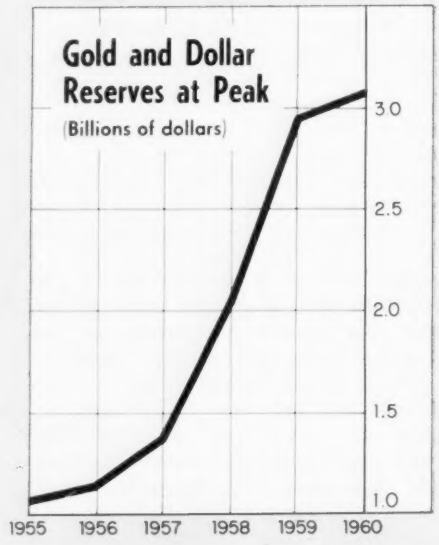
• **Future Growth**—Italy's boom is likely to continue for some time. In the last few years, rapid increases in consumer outlays have been a powerful upward force in the economy. Since living standards still leave much to be desired, consumer expenditures will continue to rise, helping to push the economy forward.

Almost all sectors of industry are continuing to

Profile of Progress in Italy







set new records. Examine these principal Italian industries . . .

• **Steel**—About 270,000 tons of castings and nearly 840,000 tons of steel were produced in June, 1961. In the like 1960 month, castings output totaled 260,000 tons and steel production reached 762,000 tons. During the first six months of 1961, steel production totaled 5 million tons—up 10 per cent from the like 1960 period. Castings output rose 17 per cent to 1.6 million tons. Total 1960 crude steel output topped 9 million tons.

• **Autos**—In 1960, Italian carmakers turned out 595,103 units—up 26 per cent from the 1959 mark. The nation's auto industry exported nearly $200 million worth of its products in 1960.

• **Sewing Machines**—Production in 1960 totaled 483,460 units—up 2.3 per cent from the 1959 level.

• **Office Equipment**—Output of typewriters and calculators in 1960 totaled 923,878 units— a jump

of 36 per cent from the 1959 mark. Exports were valued at $80.6 million.

• **Freight Cars**—Output last year reached 55,161 units—up 62 per cent from the 1959 mark.

• **Construction**—Construction has increased during every year for the last decade. Gross value of output for the construction industry in 1960 totaled $3.1 billion—up 3 per cent from the 1959 mark. Residential construction accounted for $1.75 billion.

• **Foreign Trade**—Three forces pushed Italy's foreign trade to record levels in 1960: 1. Many quantitative restrictions on imports were removed in 1959 and 1960. 2. The swift growth in industrial production forced upward the demand for imported machinery and materials. 3. Lower tariffs went into effect among Italy and its fellow Common Market nations.

Those forces pushed imports to a record $4.7 billion and exports to a record $3.6 billion. Metalworking registered the biggest gains in Italy's purchases from abroad.

	(Millions of Dollars) 1959	1960	% Increase
Steel Mill Products	144	257	79%
Iron & Steel Scrap	108	152	41%
Copper & Alloys	73	132	81%
Crude Oil	432	463	7%
Raw Wool	136	167	23%
Coal	122	149	22%
Meat Products	93	113	21%

U. S. firms maintain a large segment of the Italian market, as this listing of U. S. exports to Italy shows . . .

	(Millions of Dollars) 1959	1960	% Change
Industrial Machinery	33.5	54.6	+ 63%
Refined Copper	8.5	38.7	+355%
Iron & Steel Scrap	10.6	32.1	+203%
Elec. Mach'y & Appa.	16.4	15.8	− 4%
Coal	47.3	42.3	− 11%
Cellu. & Resin Mat.	12.6	11.4	− 10%
Synthetic Rubber	8.6	16.8	+ 95%

• **Investment**—From 1950 through 1959, U. S. direct investment in Italy increased more than fivefold. By the end of '59, the total stood at $313 million, reports Chase Manhattan Bank. The availability of cheap labor has been one of Italy's principal attractions. At the beginning of 1961, average wage rates in manufacturing were estimated at 64 cents an hour (including 28 cents in social costs). But there is a difference of up to 25 per cent—and sometimes more—in rates between Milan and part of Sicily. Rates decline as you go south.

• **Banking**—In Italy, as in the U. S., commercial banking and investment banking are separated by law. Short term credit (up to one year) is extended by the commercial banks. Long term credit is available through special institutions, the largest of which is the government-sponsored Istituto Mobiliare Italiano. Several specialized banks and regional credit institutions make medium-term loans.

• **Italian Life**—The Italian climate is somewhat similar to that of California, ranging from temperate in the North to subtropical in the South.

Italy has many excellent schools at all levels, including several international schools in Rome. Most private schools are run by Catholic institutions, but are open to all. Some offer instruction in both Italian and English.

The United Nations reports that living costs in Rome average 15 to 20 per cent lower than in New York. That assumes some adaptation to the Italian pattern of consumption. Rent, entertainment, and most foods cost less in Italy; gasoline, meats, and appliances cost more.

• **Machine Tool Market**—In 1959, ISTAT made a machine tool census. It found that more than 56 per cent of the tools were more than ten years old and that 33 per cent were more than 20 years old. It indicates that Italy will continue, for some time, to be an important market for U. S. machine tools, if the nation is to update its equipment for production efficiency.

What Italy Buys from U.S.

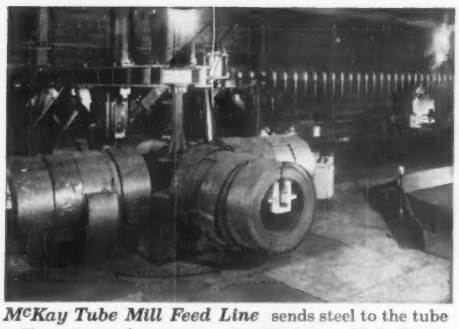
(Selected 1960 U. S. exports to Italy—Millions of Dollars)

Generators & Parts	0.74
Electric Motors, Controls & Parts	2.46
Material Handling Equipment	1.21
Machine Tools	16.60
Metalcutting Types	10.44
Lathes & Automatic Screw Machines	3.59
Tapping, Threading & Boring	0.43
Milling	0.44
Drilling	0.05
Gearmaking	2.45
Grinding	1.28
Others	2.20
Metalforming Types	6.16
Rolling Mill Machinery	3.05
Cleaning & Finishing Equipment	0.07
Foundry Equipment	1.02
Ores, Concentrates, Scrap & Forms:	
Aluminum	10.89
Copper	47.53
Nickel	1.53
Other Nonferrous	3.61
Bearings	0.83
Pumps, Condensers, Heat Exchangers	1.52
Paint Spraying Equipment	0.13
Packaging Machinery	0.44
Office Machines	7.38
Office Furniture	0.03
Motor Vehicles & Parts	3.16
Aircraft & Parts	17.60
Watercraft & Parts	1.60
Railway Equipment	1.21
Radios, TV sets & Parts	12.31
Major Household Appliances	0.94
Instruments, Related Items	6.64
Steel Mill Products	18.72
Semifinished	1.10
Bars	0.27
Sheets & Strip	10.97
Pipe & Tubing	0.77
Tin Plate	5.03
Wire	0.05
Plates	0.23
Shapes	0.24
Other	0.06
Castings & Forgings	0.91
Pig Iron	1.08
Iron & Steel Scrap	30.91

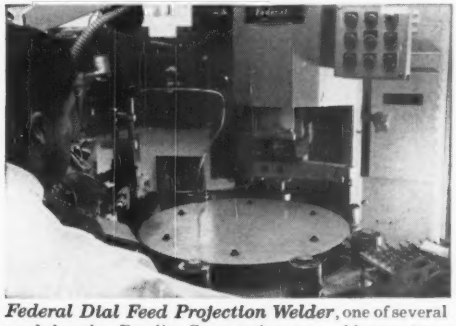
Warco
PRESS

◀ ***Warco Press Line*** composed of three 400-ton straight side, eccentric gear presses forms automobile wheel "spiders" at The Budd Company's Detroit plant. Here, William F. Longfield, manager of press engineering and sales for McKay's Federal-Warco Division, looks over a finished wheel with Edwin Seiberlich, works manager, and R. O. Greenshields, plant manager.

Photo by ARNOLD NEWMAN



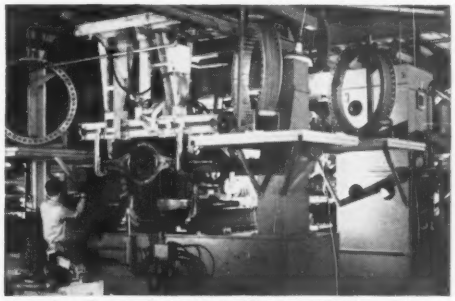
McKay Tube Mill Feed Line sends steel to the tube mill continuously at a rate of 1,800 fpm at U. S. Steel's National Tube plant at Lorain, Ohio.



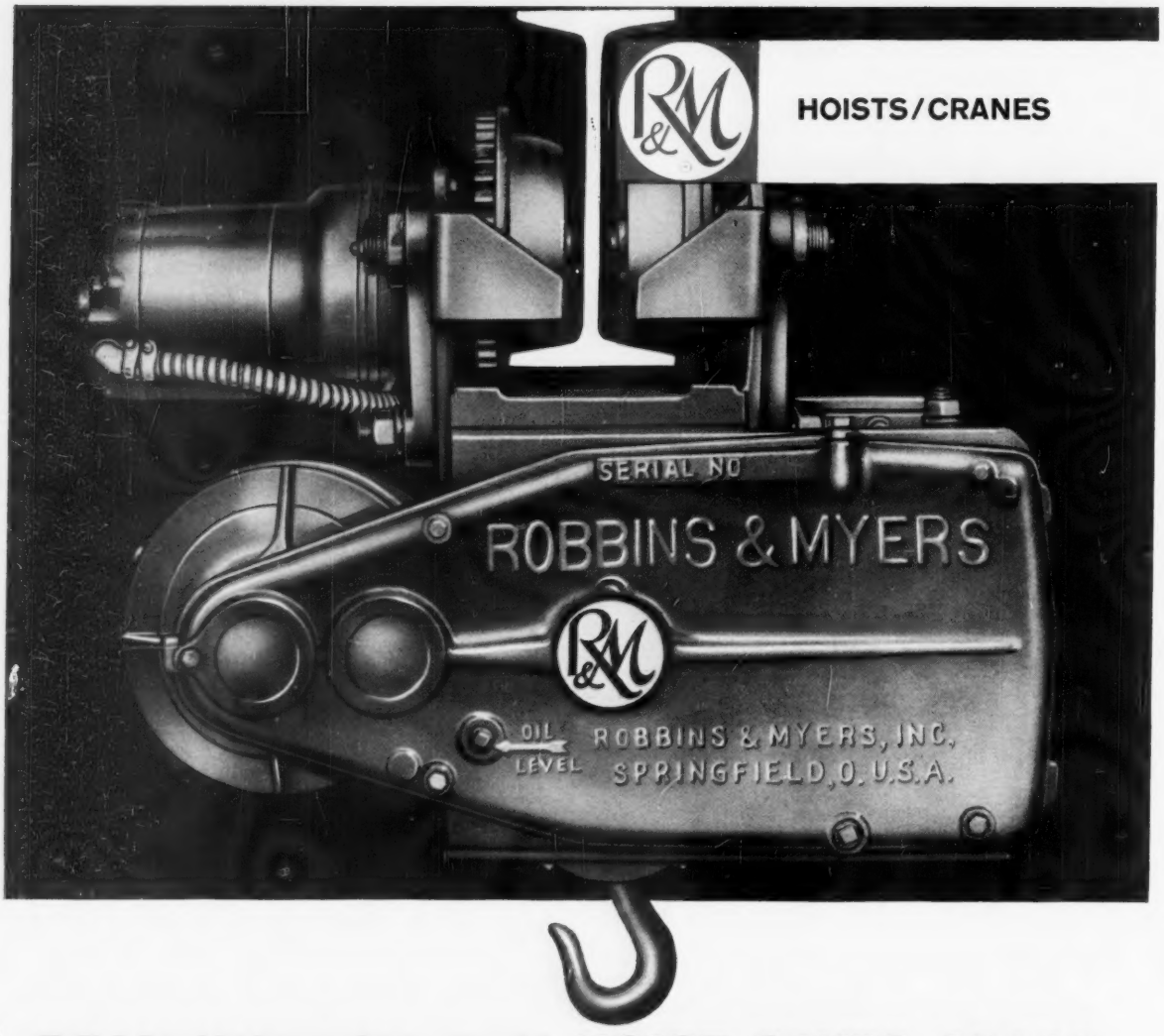
Federal Dial Feed Projection Welder, one of several used by the Bendix Corporation to weld transistor assemblies. It will weld 2,000 assemblies per hour with exacting precision.

Uncoiling, flexing, processing, slitting, shearing, feeding, forming, stamping, and welding . . . keeping ***metal in motion*** in the most economical manner possible, from coil to finished product, ***is the business of McKay Machine.***

McKay Machine, its divisions and subsidiaries produce the widest range of metal preparation, processing, forming and welding equipment available anywhere. Because of this they can design and build complete, integrated production lines of perfectly mated machinery. This makes it possible to achieve compactness and bring about efficiencies not otherwise practical. It also means the manufacturer is concerned with only a single source of responsibility and supply. That's why more and more cost-conscious metalworking firms are making it a point to know *The McKay Machine Company, Youngstown 1, Ohio.*

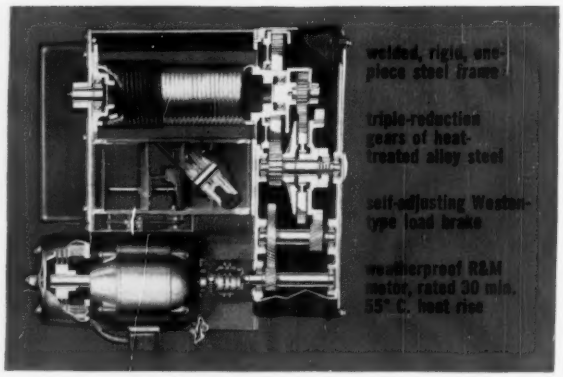


Berkeley-Davis Automatic Fusion Welding Lines, such as this one of two recently installed at American Metal Products Company in Detroit for the automatic production of over 200 sizes of motor vehicle axle housings, lead the industry in precision operation, production efficiency, and flexibility.



BEAM-HUGGING R&M HOIST SAVES SPACE

R&M Type F Hoists hug the beams to save valuable overhead plant space! The drum is along one side of the beam; the motor-and-brake assembly parallel along the other side. This compact design—*yours at no extra cost*—gives inches more usable lift, without building higher runways. It permits closer end approaches, provides greater side clearances. Many safety features protect operator, hoist and load—weight-type upper limit switch, low-voltage control circuit, fully magnetic control, Weston-type automatic load brake, and others. Type F Hoists are available in four frame sizes, ½ to 10 ton capacity, powered by 1½ to 15 HP R&M motors. Mountings include lug suspension, push-type, hand-geared, and choice of three motor-driven trolleys. Write today for Bulletin 920-ST


welded, rigid, one-piece steel frame
triple-reduction gears of heat-treated alloy steel
self-adjusting Weston-type load brake
weatherproof R&M motor, rated 30 min. 55° C. heat rise

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Combining hot forging and cold extrusion . . .

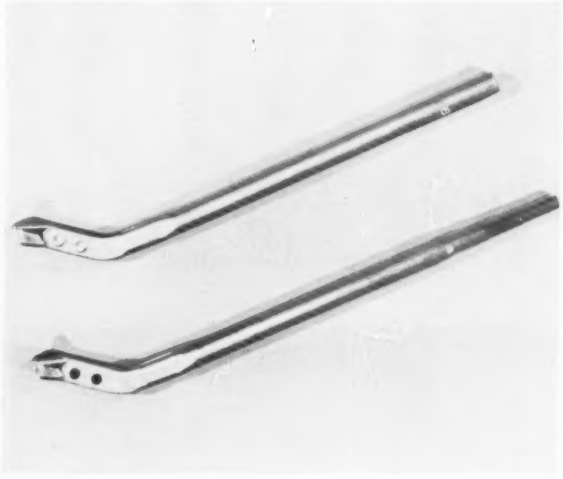
Chrysler Redesigns Parts, Cuts Costs

BY JOINING hot forming and cold extrusion processes, Chrysler Corp. has improved quality and trimmed costs on a variety of parts. The "hot-cold" approach usually calls for part redesign, says A. L. Gostow, general manager of the forge and foundry plants. Discussing the methods with Detroit members of the Society of Automotive Engineers, he asserted: "You must insist on predesign meetings with production and manufacturing so you can put designs, processes, and jobs into production the best way the first time." Here are four examples that should give your engineers some ideas.

STRUT ARM (SAE 1045)

This torsion suspension part was originally made as a solid hot forging. After normalizing and cleaning, rough formed parts were shipped to a machine plant where two holes were drilled in the foot end. That end was milled and the other end was turned. A machined tread and cotter key hole also were provided. Shipping costs and machining operations boosted unit costs.

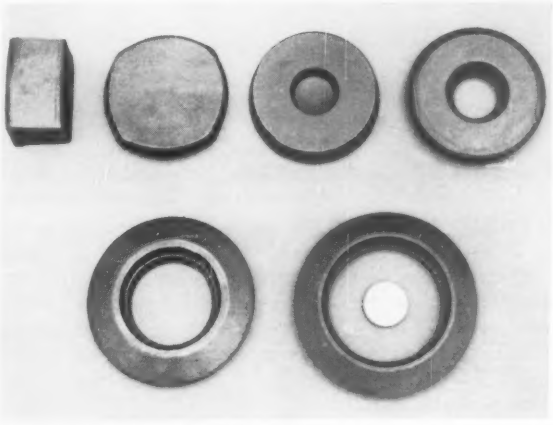
After redesign to eliminate the material previously machined off, the strut is still forged to shape, but while it's still hot the holes are punched into it and the foot end is coined. The technique eliminates the drilling and milling steps. After normalizing, the other end is phosphate coated and cold extruded through a carbide ring, locating from the hot punched holes. The thread is cold rolled while the part is warm from extruding. A self-locking nut eliminates the cotter key hole. All operations are now done in the same plant. Total savings: 20 per cent.



RING GEARS

Material costs about 9.5 cents a pound. The common method is to flatten a slug of SAE 4027 steel and form a doughnut. The part is hot finish forged on a press. Excess material is punched from the inside and trimmed from the outside. Four steps are needed to make the part. Slug and flash scrap runs from 4 to 6 lb depending on gear size.

Chrysler has replaced that method with combined hot pressing and hot rolling operations which reduce scrap to only 0.4 lb (the white dot in the center of the ring). Billets are heated to 2250° F and flattened. A second operation fills out a die impression with a hydraulic punch while the die is closed. As the die is filled, pressure builds up to the point where the punch backs off when a preset pressure is reached. The part is turned over, the 2 in. slug punched out,



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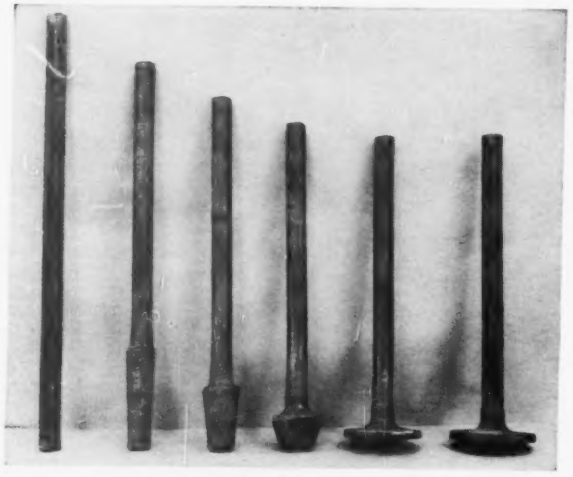
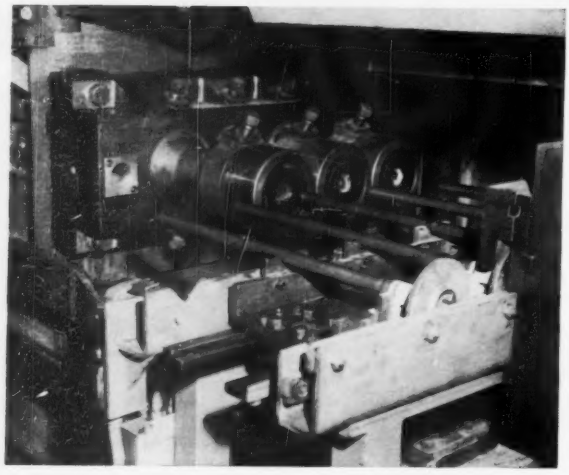
and the hole slightly expanded in a third operation. Press rate is 360 pieces an hour.

The punched blanks are conveyed to two, automatic ring rollers where each blank is dropped over a free running mandrel. An eccentric feed pushes the blanks against a large diameter power roll that has a groove cut into it to match the outside contour of the ring gear. The pressure of the inner mandrel pushes the steel into the groove of the large roll, rotates the piece, and rolls it into a partial ring. A second groove in the large power roll is used to obtain the final outside diameter. The small mandrel produces the inside diameter. Volume of material in the blank determines both diameters.





FLANGED REAR AXLE

A single heat and five forging passes are needed to rough form the parts (top picture) from SAE 1039 bar stock. They're then carried through a horizontal, 175 ton, cold extrusion press at a stroke speed of 40 to 60 fpm (lower picture). Each of the three stations performs part of the extrusion. Since each station is always filled, a finished part comes out with each stroke of the press. Diameter reduction is more than 30 per cent.

This part is newly designed for Valiant and Lancer cars, but the method is expected to be extended to all axle production. It will replace traditional hot forging and machining methods.

Prof Says Auto 'Blow-By' Devices Will Pollute Air

ANTISMOG DEVICES such as the crankcase "blow-by" system recommended by the Automobile Manufacturers' Association for 1963 cars and trucks will merely substitute a new kind of air pollution for the old, says Stanford University Prof. Philip A. Leighton. In his new book, *Photochemistry of Air Pollution*, he asserts that the amount of nitric oxide (NO) in auto exhausts must be reduced as well as hydrocarbons.

Nitric oxide becomes nitrogen dioxide (NO_2) when exposed to sunlight. It is the combination of NO_2 with hydrocarbons that produces the common air pollutants. If only hydrocarbons are eliminated, toxic NO_2 will remain in the atmosphere in a higher concentration and could cause more trouble than smog does today, Dr. Leighton believes.

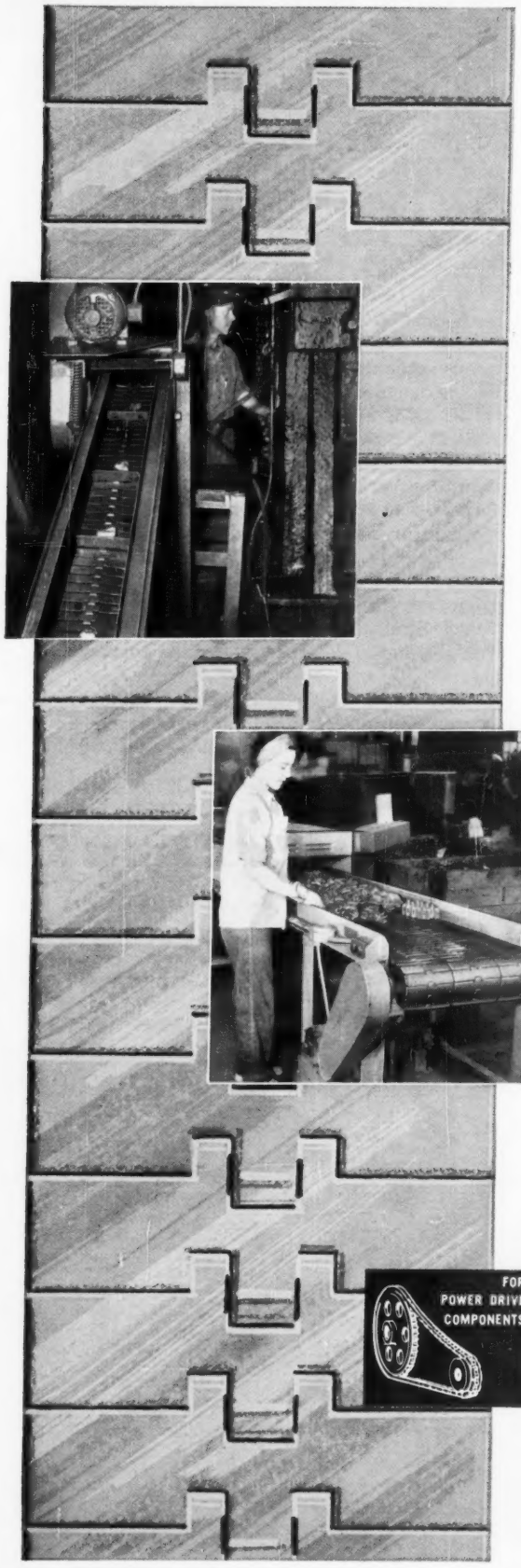
U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	354,711	407,691
October	557,200	617,972
November	646,015	597,638
11 mo. Totals	4,929,100	6,172,686
December	.....	523,422
Total	.....	6,696,108

Week Ended	1961	1960
Nov. 18	154,230	149,753
Nov. 25	124,292	111,091
Dec. 2	164,834	135,348
Dec. 9	161,454	135,328
Dec. 16	165,331†	130,711
Dec. 23	150,000*	114,941

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.



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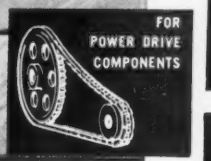
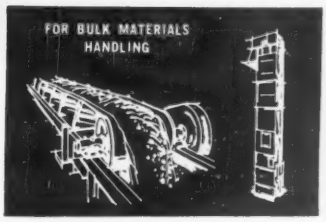
INDUSTRY'S HELPING HAND





Now **you can get USS "T-1" Steel from Steel Service Centers coast to coast.**

STEEL SERVICE CENTER INSTITUTE

"T-1" Steel throat swallows 150,000 tons of coal a year

This mining machine in action looks like a greedy dragon at the mine face, stuffing its mouth with coal at the rate of about 150,000 tons a year.

The material selected for the conveyor "throat" was USS "T-1" Steel. The designers and builders, Lee-Norse Company, wanted a steel that would stand up under the grinding action of the coal for at least 200,000 tons. So far, USS "T-1" Steel has more than met their expectations . . . not only in the conveyor deck plates but also in the crawler wear plates.

Recently, one of these machines was rebuilt, yet it will continue to use its *original* "T-1" Steel conveyor deck plates. These plates handled about 260,000 tons of coal on the first time around and there's a possibility they might be able to handle another 250,000 tons before replacement is needed.

The reasons for the long life of USS "T-1" Steel are its high resistance to impact abrasion, plus great strength and toughness. In other applications, such as shovel teeth and lips, chutes and vibrating screens, USS "T-1" Steel has outlasted other metals up to five times! This means substantial reductions in maintenance costs and the big machines stay on the job longer.

USS "T-1" Steel and the new, lower-priced "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributor of USS 'T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks.

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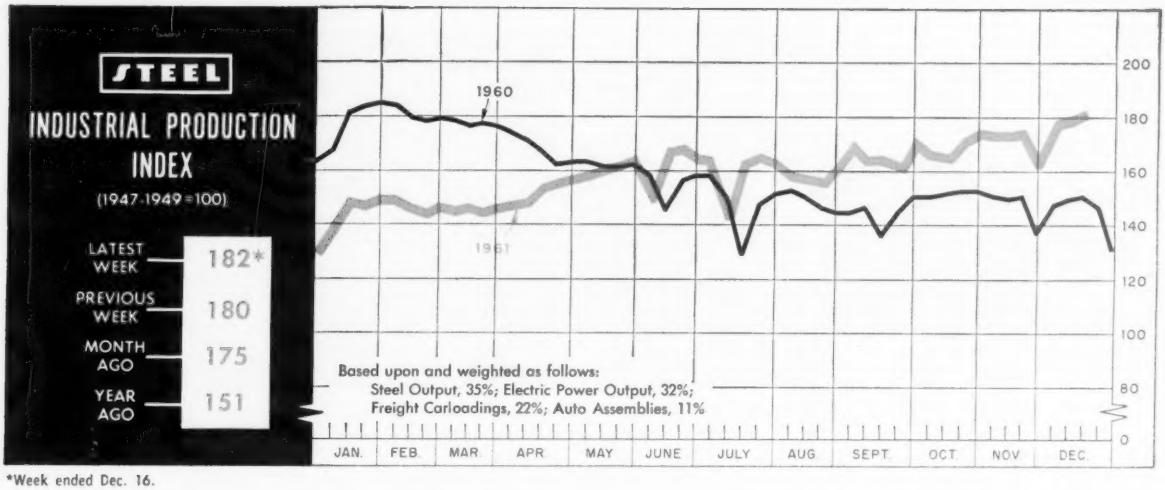
United States Steel



*Week ended Dec. 16.

Forecasts Reassert Strength of '60s

IN MANY RESPECTS, the last days of 1961 bring back memories of the corresponding period of 1959 and all the talk about the Soaring Sixties: Production is moving up; employment is improving; earnings are setting records; spending is uptrending.

Prognostications of most businessmen for 1962 make it appear that the promise of the sixties is only one flip of the calendar away. Some people have never doubted that the period would be golden. Here's what Russell Gray, president of the Air-Conditioning & Refrigeration Institute, has to say: "Two years ago, on the eve of the current decade, it was forecast by spokesmen for our industry that the sixties would break all records for the development, production, and use of the equipment it produces. We see no reason to alter this forecast now—in fact, our experience during 1960 and 1961 gives us reason to believe that we may have erred on the side of modesty."

• **Elements of Truth**—While that comment may not be typical of all industry, it must be recorded that, over-all, the early part of the decade has been expansionary, although not to the degree that one might desire. So the original forecasts gain credence when you consider that we have had growth despite a mild recession.

Unlike the last two years, when some industries suffered while others hardly slowed down for the recession, 1962 looks like it is going to be good right across the board. That is the conclusion reached from the annual forecast made by the economists at Prentice-Hall Inc., Englewood Cliffs, N. J.

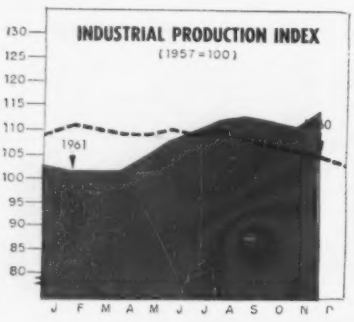
• **Broadly Speaking**—In terms of the over-all barometers, the P-H economists see gross national product climbing to about $575 billion (annual rate) by late 1962, with an average for the year between $557

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,230[1]	2,200	1,325
Electric Power Distributed (million kw-hr)	16,530[1]	16,084	15,440
Bituminous Coal Output (1000 tons)	8,500[1]	8,870	7,731
Crude Oil Production (daily avg—1000 bbl)	7,350[1]	7,397	7,132
Construction Volume (*ENR*—millions)	$393.0	$316.9	$300.9
Auto, Truck Output—U. S., Canada (*Ward's*)	200,940[1]	198,512	161,126
TRADE			
Freight Carloadings (1000 cars)	540[1]	561	486
Intercity Truck Tonnage (changes from year ago)	+10.5%	+9.5%	−5.1%
Business Failures (Dun & Bradstreet)	295	356	360
Currency in Circulation (millions)[2]	$33,938	$33,578	$33,038
Dept. Store Sales (changes from year ago)[2]	+1%	+3%	−1%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$29,095	$30,888	$25,212
Federal Gross Debt (billions)	$296.8	$296.8	$290.3
Bond Volume, NYSE (millions)	$35.5	$28.4	$29.0
Stocks Sales, NYSE (thousands of shares)	21,990	17,596	17,846
Loans & Investments (billions, adjusted)[3]	$117.1	$117.3	$108.7
U. S. Govt. Obligations Held (billions)[3]	$33.8	$33.9	$29.8
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	224.1	224.2	216.2
All Commodities[6]	118.9[1]	118.9	119.4
Commodities Other than Farm & Foods[6]	127.5[1]	127.5	127.8

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

THE BUSINESS TREND



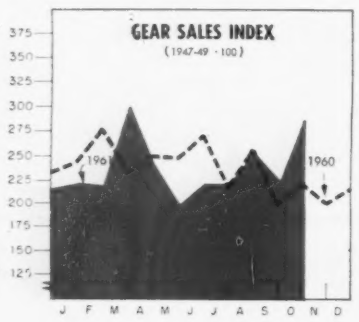
(Seasonally adjusted)

	Total Production 1961	Total Production 1960	Total Mfg. 1961	Total Mfg. 1960	Durables Mfg. 1961	Durables Mfg. 1960
Jan.	102	111	101	112	95	111
Feb.	102	110	101	110	94	109
Mar.	102	109	102	110	95	108
Apr.	105	109	105	109	99	106
May	108	110	108	110	103	107
June	110	109	111	110	105	105
July	112	110	112	110	107	106
Aug.	113	108	113	108	108	104
Sept.	111	107	111	107	105	102
Oct.	113	106	113	106	107	101
Nov.	114*	105	114*	104	109*	98
Dec.	...	103	...	103	...	96
Avg	...	108	...	108	...	104

Federal Reserve Board. *Preliminary.

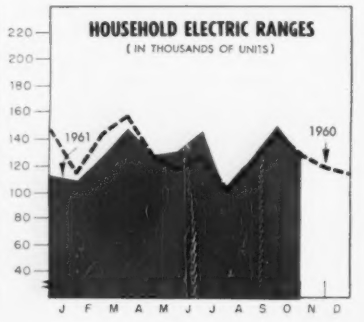
	1961	1960	1959	1958
Jan.	116.24	114.96	115.84	93.07
Feb.	114.39	128.74	124.77	93.49
Mar.	136.96	133.60	146.36	97.89
Apr.	109.85	122.41	147.28	122.36
May	136.47	150.33	164.45	118.04
June	175.51	160.23	170.72	131.15
July	130.72	126.79	130.26	134.34
Aug.	113.28	131.33	87.02	104.46
Sept.	120.82	111.11	126.43	85.41
Oct.	125.04	99.89	131.09	111.35
Nov.	.....	98.96	124.16	110.88
Dec.	.....	110.00	113.78	105.97
Avg	.....	122.55	131.85	109.87

Material Handling Institute Inc.



	Bookings 1961	Bookings 1960	Shipments 1961	Shipments 1960
Jan.	220.8	243.4	227.3	207.3
Feb.	218.3	278.6	214.4	230.2
Mar.	299.3	231.8	246.8	244.6
Apr.	241.9	249.2	233.9	234.8
May	198.0	246.9	239.1	241.3
June	220.0	269.8	245.4	253.6
July	219.8	217.5	200.1	210.8
Aug.	252.5	255.8	240.4	217.3
Sept.	223.3	197.9	225.4	223.5
Oct.	285.5	219.9	237.8	220.6
Nov.	....	198.9	....	226.7
Dec.	....	216.5	....	220.0
Avg	....	235.5	....	227.6

American Gear Mfrs. Assn.
Charts copyright, 1961, STEEL.



	Total Factory Sales—Units 1961	1960	1959
Jan.	109,400	116,000	120,800
Feb.	128,100	144,500	134,600
Mar.	148,200	157,700	172,600
Apr.	128,400	127,900	136,100
May	131,600	118,500	133,400
June	145,000	127,200	151,400
July	104,000	102,900	129,200
Aug.	127,500	123,400	116,600
Sept.	150,300	144,000	157,200
Oct.	126,800	129,100	143,400
Nov.	.....	119,400	144,000
Dec.	.....	114,400	147,500
Totals	.....	1,525,000	1,686,800

National Electrical Mfrs. Assn.

billion and $568 billion. The Federal Reserve Board's index of industrial production will advance to about 122 (1957 = 100) by yearend, and it will average about 120 for the year. However, in both cases, the climb will be less spectacular than the advances from the recession trough to date.

Hard goods will show a 10 to 14 per cent jump at the retail level, and spending on all goods will climb about 8 per cent—equal to the growth in spending for services. Business plant and equipment expenditures will "hover around $37 billion for all of '62. Only in the latter half are they likely to reattain and possibly exceed the all-time peak of $37.8 billion (annual rate) hit in the summer of '57."

Construction is expected to show only moderate gains next year, with the current rise in housing possibly peaking out during the first half.

Prentice-Hall does not rule out another mild recession in early 1963. "However, a genuine capital goods boom, bigger than projected buying of consumer hard goods and homes, and higher than expected defense outlays . . . would accelerate the expansion and carry it into 1963."

- **Down to Specifics**—Here is what P-H sees for some important metalworking markets in 1962:
- **Agricultural Equipment**—Factory unit sales increased 4 per cent this year, but they will increase only a shade next year because farmers' net receipts will be only fractionally higher than they were in 1961.
- **Appliances**—Production of appliances will increase by 12 to 13 per cent next year. Firmer demand is likely to bring 3 to 5 per cent price hikes on many appliances.
- **Autos and Trucks**—Passenger car output should total about 6.7 million units, and truck production should come to 1.2 million units.
- **Containers**—Can and bottle shipments will show a gain of about 4 per cent this year over last, but next year's improvement should be slightly less.
- **Electric Utilities**—Sales of electricity should rise by 7 per cent in 1962. As a result, electric utility capital expenditures will top the $4.7 billion in 1961 by about 3 per cent.
- **Electronics-Aerospace**—After topping the $10 billion sales pace in 1961, this industry will go on to about $11 billion next year.
- **Machinery**—"With emphasis of manufacturing industry capital spending in 1962 to be on replacement and modernization, machinery producers can expect an increase of up to 5 per cent in the year ahead."
- **Office Equipment**—Sales should gain by 10 to 12 per cent, with profits doing even better. It is likely the year-to-year gains of 30 per cent in orders for September and October will extend into 1962.

A. S. CHALFANT
A. M. Byers president

WILLIAM J. STEPHENS
J&L executive v. p.

DANIEL C. McCARTHY
Pratt & Whitney president

BARNEY N. DAGAN
Kaiser Steel v. p.

A. S. Chalfant, vice president-sales, was elected president of **A. M. Byers Co.,** Pittsburgh. He succeeds **Buckley M. Byers,** resigned. **Samuel Salem,** former vice president-general manager, was made chairman. Mr. Byers, who has taken a post with Blaw-Knox Co., remains a director.

William J. Stephens was elected executive vice president of **Jones & Laughlin Steel Corp.,** Pittsburgh, effective Jan. 1. He was assistant vice president-sales of Bethlehem Steel Co.

Robert R. Shedd was named chief engineer at **Midwest Steel Div.,** Portage, Ind., National Steel Corp. He succeeds **L. A. Fugassi,** transferred to National Steel's office in Pittsburgh.

Harvey A. Craig was appointed general manager of sales, **Republic Steel Corp.,** Cleveland. He succeeds **S. A. Crabtree,** recently elected vice president-sales. Mr. Craig has been assistant to the vice president-sales.

Daniel C. McCarthy was elected president, **Pratt & Whitney Co. Inc.,** West Hartford, Conn. He joined P&W in 1960 as administrative vice president, and was elected executive vice president in February, 1961. Since last April, following resignation of **Jacob J. Jaeger,** then president, Mr. McCarthy has served as chief operational officer.

George L. Mitsch was named general manager, **Decatur Casting Co.,** Decatur, Ind.

I. D. Holster Jr. was made manager, Welding Products Dept., **Airco Co. International,** New York, division of Air Reduction Co. Inc. He succeeds **A. M. Andrews Jr.,** recently named president of Airco Co. International. Mr. Holster will direct all overseas marketing.

Leonard C. Schmidt fills the new post of vice president-manufacturing, **Holtzer-Cabot Corp.,** Boston. He was director of manufacturing at Itek Corp., Lexington, Mass.

Barney N. Dagan and **Gerard E. Balsley** were elected vice presidents of **Kaiser Steel Corp.** Mr. Dagan, formerly works manager at the company's Fontana, Calif., steel mill, continues his office there. He will direct company steelmaking operations at Fontana. Mr. Balsley has served as manager of industrial relations since 1953.

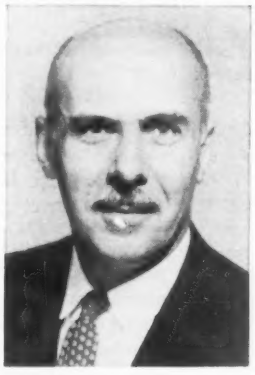
Paul J. Gepfert was elected vice president of **Loopco Industries Inc.,** Cleveland. He has been with Yoder Co. for 12 years.

Stewart B. Ashton was made general manager, **C. I. Hayes Inc.,** Cranston, R. I. He was chief engineer, and now is responsible for company policies pertaining to sales, manufacturing, research, development, and finances.

Duane S. Bosma was made manager of manufacturing for Crane Co.'s **Swartwout Div.** and **Chapman Valve Mfg. Co.,** a subsidiary. He was operations manager of Trail-

HARVEY A. CRAIG
Republic gen. sales mgr.

LEONARD C. SCHMIDT
Holtzer-Cabot mfg. v. p.



STEWART B. ASHTON
C. I. Hayes gen. mgr.

DUANE S. BOSMA
Chapman-Swartwout mfg. mgr.

THOMAS H. WILBER
Bullard secretary

JOHN T. McCARLEY
Yale & Towne post

SMITH BOLTON
Wickes v. p.-operations

PHILIP KAUFMAN
Metal Blast v. p.

GEORGE J. PEER
Basic Inc. v. p.-sales

ALEX A. KERR
Roebling mfg.-mgr.

JACOB J. JAEGER
Massey-Ferguson Ltd. v. p.

FRANK J. RUGGIERO
Detroit Broach chief eng.

HENRY A. HUDSON
Vanadium-Alloys sales mgr.

mobile Inc. and before that works manager of Bucyrus-Erie Co.

Jacob J. Jaeger, former president, Pratt & Whitney Co. Inc., was appointed vice president-engineering, **Massey-Ferguson Ltd.,** Toronto, Ont.

Frank J. Ruggiero was made chief engineer, **Detroit Broach & Machine Co.,** Rochester, Mich.

Henry A. Hudson fills the new post of sales manager for **Vanadium-Alloys Steel Co.,** Latrobe, Pa. He was Boston district manager.

Superior Industries Inc., Youngstown, promoted **J. F. Henry** from production manager to vice president-general manager; **Harry W. Pritchard** from sales manager-Commercial Extrusion Div., to general sales manager.

Thomas H. Wilber, purchasing agent, **Bullard Co.,** Bridgeport, Conn., was elected secretary. He has served, in addition, as assistant purchasing agent and manager of the Bullard-Dunn Div.

John T. McCarley was named director of manufacturing for international operations of **Yale & Towne Mfg. Co.,** with headquarters in New York. **W. Atkinson Adam** succeeds Mr. McCarley as managing director of the three British divisions.

Smith Bolton, president and general manager, **United States Graphite Co.,** Saginaw, Mich., division of **Wickes Corp.,** was named vice president-operations of the parent corporation. **Ralph Zemanek** was named divisional manager to succeed Mr. Bolton. **Fremont F. Ruhl** was made general sales manager, and is succeeded as sales manager by **Richard B. Thomson.**

Philip Kaufman was named vice president-sales and engineering of **Metal Blast Inc.,** Cleveland. He has headquarters in the Pittsburgh office. He was assistant vice president at Pittsburgh Crushed Steel.

George J. Peer was elected vice president-sales, **Basic Inc.,** Cleveland. He was general sales manager.

Alex A. Kerr was made manufacturing manager of Roebling steel wire mills for Colorado Fuel & Iron Corp.'s **John A. Roebling's Sons Div.,** Trenton, N. J.

Kenneth H. Brinsmead was made director of research and development at **Shaw Process Development Corp.,** Port Washington, N. Y., division of Avnet Electronics Corp.

David R. Butler was made sales manager, **Vlchek Plastics Div.,** Vlchek Tool Co., Cleveland. He has headquarters at the Vlchek plastic plant, Middlefield, Ohio.

E. V. Huggins was named executive vice president, associated activities, at **Westinghouse Electric Corp.,** Pittsburgh. He was vice president and chairman of the executive committee. **George L. Wilcox** was made vice president and deputy to the executive vice president, **John K. Hodnette.** Mr. Wilcox was vice president and assistant to the president.

ROBERT H. ETNYRE
National Supply Div. post

EDMUND V. DOWDEN
Conco manufacturing v. p.

RODERICK J. WHELAN JR.
Ohio Nut & Bolt pres.

DAVID C. ROSCOE
Bethlehem asst. v. p.

Robert H. Etnyre was made manager of machinery production for **National Supply Div.**, Pittsburgh, Armco Steel Corp., a new post. **Clinton B. Cooke** succeeds Mr. Etnyre as works manager, Houston plant. Mr. Etnyre continues headquarters in Houston.

Edmund V. Dowden was made manufacturing vice president, **Conco Engineering Works Inc.**, Mendota, Ill. He joined Conco Dec. 5. He was with Electric Controller & Mfg. Co., Cleveland, division of Square D Mfg. Co. He assumes responsibilities of **H. J. Kettleborough**, operating vice president, who retires in late 1962, continuing until then as assistant to the president.

John L. Sullivan was named Chicago district manager for **Kennametal Inc.**, effective Jan. 1. He succeeds **Fred Hennig Jr.**, who becomes field sales manager at company headquarters in Latrobe, Pa.

F. H. Frey was named assistant manager of roll sales, **Blaw-Knox Co.**, Pittsburgh.

Louis Branzburg was made chief engineer, **Waldes Kohinoor Inc.**, Long Island City, N. Y.

Joseph M. Gartner was elected vice president-operations, **Borg - Warner International Corp.**, Borg-Warner Corp., Chicago.

William G. Fallon Jr. was made vice president-general manager, **Norton International Inc.**, Norton Co., Worcester, Mass. He is succeeded as general manager of Norton Co.'s Refractories Div. by **Allan F. Hardy Jr. Louis J. Camarra** was named vice president in charge of Latin American operations.

Roderick J. Whelan Jr., vice president, was elected president, **Ohio Nut & Bolt Co.**, Berea, Ohio, to succeed his late father, **R. J. Whelan Sr. John T. Doheny**, former sales manager, succeeds to the vice presidency. **G. F. Grey** was promoted from chief engineer to plant manager, responsible for manufacture and production scheduling. **Stanley Olszewski** was named chief product engineer.

James M. Wells was made manager of wrought ingot sales for **Aluminium Ltd. Sales Inc.** He is responsible for sale of Alcan extrusion sheet ingots in the U. S. He is in New York.

J. R. Drever was named president of ASF Research Laboratory, Bensenville, Ill., **American Steel Foundries.** He was president of two ASF subsidiaries, Griffin Wheel Co., Chicago, and Griffin Steel Foundries Ltd., Canada. He is succeeded in those posts by **C. P. Voll**, former treasurer and controller of Griffin Wheel. **R. H. Wellington** and **C. F. Strom**, former Griffin Wheel vice presidents, were elected vice presidents of ASF.

J. W. Delanty was made manager of international operations for **F. J. Stokes Corp.**, Philadelphia. He will supervise sales, manufacturing, and licensing activities outside the U. S., including subsidiaries in Canada and England.

James A. Anderson was made sales manager, Special Bearing Div., **Kaydon Engineering Corp.**, Muskegon, Mich.

Donald H. Keagan was made general manager, **High Temperature Materials Inc.**, Boston.

David C. Roscoe, general manager of sales, **Bethlehem Steel Co.**, Bethlehem, Pa., was made assistant vice president to succeed **William J. Stephens**, resigned. **Edward D. Bickford** succeeds Mr. Roscoe. He was assistant general sales manager.

J. R. Sansom was named general sales manager, Fabricated Materials Div., **Acme Steel Co.**, Chicago. He succeeds **P. L. Dafoe**, retired.

William F. Walker was named sales manager of the new Hydraulic Hose & Couplings Div. of **Imperial-Eastman Corp.**, Chicago. **M. J. Mitchell** was made sales manager of the new Engineered Products Div.

J. J. McGrann was named manager-tube sales, Steel & Tube Div., **Timken Roller Bearing Co.**, Canton, Ohio. He succeeds **W. E. Taggart**, retired.

James E. Poss was made product sales manager, Power-Strut Div., **Van Huffel Tube Corp.**, Warren, Ohio.

John F. Shanklin was elected a vice president of **Union Carbide Corp.**, New York, continuing as secretary.

Vinton D. Carver was named general manager of the new Salt Lake City, Utah, plant of Data Systems Div., **Litton Systems Inc.**

OBITUARIES...

Joseph A. Hague Sr., 61, assistant general sales manager, **Pittsburgh Steel Co.**, Pittsburgh, died Dec. 13.

Col. David B. Kennedy, 57, sales manager, **Gluntz Brass Foundry Co.**, Cleveland, died Dec. 12.

Quick Change Presses Used In Revamped Stamping Plant

STAMPING PRESSES designed for faster die changes are an important part of a modernization and expansion program completed at the Coit Road plant, Cleveland, of Fisher Body Div., General Motors Corp.

"Almost every area of the plant has been improved," says R. F. Smith, plant manager, "with new equipment or additional space to handle increasingly complex body building operations."

• **Quick Die Changes Vital**—The Cleveland plant produces stampings and subassemblies for each of 109 body styles available in 1962 General Motors automobiles. About 2100 dies are required for the job and they must be changed rapidly to minimize downtime.

New mechanical stamping presses (supplied by the Canton Mfg. Div., Canton, Ohio, of E. W. Bliss Co.) are equipped with sliding bolsters that cut die change time to about 30 minutes vs. 4 to 5 hours on conventional equipment. While one run is being made on the presses, dies for the next run can be made ready and moved into place as soon as the presses are stopped.

Automatic feeders designed by Fisher Body personnel carry stock into the presses. Completed stampings are removed from the dies by automatic unloading equipment supplied by Sahlin Engineering Co., Birmingham, Mich.

The new presses are situated in a 22,000 sq ft addition, which replaces an older building. Existing pressroom pits were removed and new ones constructed to accommodate the larger machines.

• **Scrap Disposal Mechanized**—Scrap from the stamping operation falls into underfloor conveyors, which deliver it to a central conveyor line. A baling facility at the end of the line packages the scrap in 900 lb bundles.

The baler operator monitors flow of incoming scrap, baling, or gondola loading by means of closed circuit television. The video equipment was supplied by RCA Industrial Electronic Products Div., Camden, N. J., of Radio Corp. of America.

• **New Finishing Facility**—A new parts finishing building, with a floor area of 42,000 sq ft, was built on steel stilts above an existing building.

Parts passing through the finishing area on an overhead conveyor are spray coated with vinyl material. The vinyl liquid is available in several colors from recirculating circuits. Color changes can be made without stopping the line.

Lifts Magnesium Output

Texas Div., Dow Chemical Co., plans to put two of the eight, Plant B, magnesium electrolytic cell buildings at Freeport, Tex., into production on Jan. 2. The plant has been closed since early 1958. The division has been producing magnesium at full capacity for some time at its five cell buildings in Plant A.

Latrobe Buys Furnace

Latrobe Steel Co., Latrobe, Pa., has purchased its third, consumable electrode, vacuum melting furnace which will be placed in operation in the first quarter of 1962.

Weldment Work Combined

Avery & Saul Co. (steel weldments) with plants at Cambridge and Billerica, Mass., is consolidating engineering and production at Billerica. Plant facilities at Billerica will be expanded.

Chilean Plant Opened

A plant at Huachipato, Chile, has started producing alloy steel grinding balls. It is a joint venture of Armco International Corp., subsidiary of Armco Steel Corp., Middletown, Ohio, and Compania Electro Metalurgica S. A., Santiago, Chile. Forging, sizing, and heat treating facilities are in operation. A metallurgical laboratory and a machine shop are integral units. Compania de Acero del Pacifico S. A. supplies steel for the balls. They are produced chiefly for the Chilean copper industry.

CONSOLIDATIONS

Udylite Corp., Detroit, has decided not to proceed with the proposed merger with **Metal & Thermit Corp.**, New York (STEEL, Oct. 9, p. 112).

Trinity Steel Co., Dallas, acquired **Cherokee Steel Inc.**, Tulsa, Okla., and will operate the property as a wholly owned subsidiary. James Jackson will continue as president of Cherokee Steel. Both firms produce steel pressure vessel and other steel fabricated products.

Litton Industries Inc., Beverly Hills, Calif., acquired **Ingalls Shipbuilding Corp.**, Pascagoula, Miss., builder of nuclear submarines and surface vessels and developer of marine electronics. F. J. Mayo will direct activities of Litton's Ingalls Div.

The Ingalls plate and barge fabricating plant at Decatur, Ala., is not included in the sale and will be operated as the Marine Div., Ingalls Iron Works Co., Birmingham. Ingalls Iron Works also plans to continue operation of other Ingalls facilities, including structural steel fabricating plants at Birmingham and at Verona, Pa.; a plate and tank fabricating plant in Birmingham; and the Ingalls Steel Construction Co., a wholly owned subsidiary.

American Machine & Foundry Co., New York, is negotiating for the purchase of **New Rochelle Thermatool Corp.**, New Rochelle, N. Y.

Dura Corp., Oak Park, Mich., acquired **Automatic Writing Systems Inc.**, Detroit, and renamed the operation Dura Business Machines Inc. The new subsidiary manufactures ultraspeed, electromechanical writing and data processing peripheral equipment.

NEW PLANTS

Caine Steel Co., Chicago, is building a branch facility at 9050 State Rd., Philadelphia, Pa. It will contain about 33,000 sq ft of fabricating and warehousing space and 3000 sq ft of office space. The project will be completed about May 1.

Durant Mfg. Co., Milwaukee, has moved its manufacturing facilities into an enlarged (56,500 sq ft) plant in Watertown, Wis. The firm's executive offices, general accounting, and sales departments remain in Milwaukee. The firm makes industrial counting and measuring instruments.

M-H Standard Corp. opened a 110,000 sq ft manufacturing plant at 400 Heaton St., Hamilton, Ohio, replacing the three separate plants the company formerly operated in Jersey City, N. J. The company will continue the production of conveyors and live storage equipment, but it plans to expand into larger and more diversified equipment.

Wafe Div., Miniature Precision Bearings Inc., opened an 8000 sq ft manufacturing facility on Honeyspot Road, Stratford, Conn. The facility is designed to produce precision tools and dies and miniature ball bearing retainers.

Hubbell Metals Inc., St. Louis, is establishing a plant in Gadsden, Ala., that will be ready for occupancy by February, 1962. It will have 22,000 sq ft of warehouse space. Equipment will include a gang slitter capable of handling 30,000 lb coils, up to 50 in. wide, and up to 3/16 in. gage.

Gillette Safety Razor Co., a division of the Gillette Co., Boston, will construct a blade manufacturing plant and a shipping and receiving building (including an office) adjacent to the main plant in South Boston, Mass.

Hubbard & Co., Chicago, is constructing a 19,000 sq ft warehouse in Elizabeth, N. J., that will be in operation in January. The company makes pole line hardware, electrical protective equipment, and street lighting products.

Kawneer Co., Niles, Mich., is constructing a manufacturing plant near Atlanta to produce aluminum walls, windows, entrance and sliding doors. The 81,000 sq ft facility is scheduled to begin operations in April.

Feralloy Corp., Chicago, processor and distributor of ferrous and nonferrous metals, established a new facility, **Feralloy Eastern Corp.**, in a 24,000 sq ft building at 2001 Kloman St., Baltimore. The company provides a metal slitting and shearing service.

NEW OFFICES

Basic Inc., Cleveland, established a new sales office in Birmingham under the management of R. T. Smith.

Tube City Iron & Metal Co., Glassport, Pa., opened a branch office in the Terminal Tower, Cleveland, Ohio. It is under the supervision of Philip Turley, vice president-industrial sales, whose headquarters remain in Glassport.

High Temperature Materials Inc., Boston, producer of pyrolytic materials, established a branch office at 355 W. Olive Ave., Sunnyvale, Calif. J. R. Goglio is the West Coast manager.

NEW ADDRESSES

Daystrom Inc., Murray Hill, N. J., moved the headquarters of its Potentiometer Div. to 8703 La Tijera Blvd., Los Angeles, Calif. R. E. Wolin is division manager; R. E. Alderman, Western regional sales manager.

Narda Microwave Corp. moved to Plainview, N. Y. The new plant doubles the square footage of the previous facilities.

Macton Machinery Co. Inc. moved to larger quarters at 131 Jefferson St., Stamford, Conn. The new building provides 3000 sq ft of additional floor space and enables the company to consolidate its plant operation.

ASSOCIATIONS

Plumbing Brass Institute, Pittsburgh, elected these officers: President, C. W. Rush Jr., Beaton & Corbin Mfg. Co., Southington, Conn.; first vice president, N. R. Lougee, Chicago Faucet Co., Chicago; second vice president, R. A. Peterman, Sterling Faucet Co., Morgantown, W. Va.; and treasurer, E. O. Harbeck Jr., Michigan Brass Co., Grand Haven, Mich.

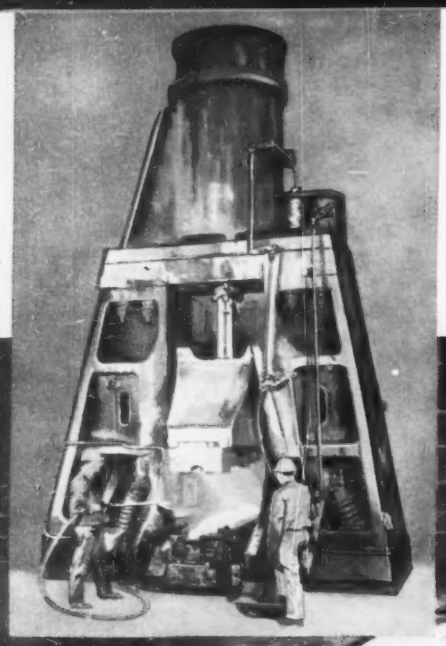
Charles R. Bender has been elevated to the office of executive vice president of the **National Tool, Die & Precision Machining Association**, Cleveland.

H. C. Jackson, Pickands Mather & Co., Cleveland, has been elected president of the **American Mining Congress**, Washington. Vice presidents are: Andrew Fletcher, St. Joseph Lead Co., New York; C. E. Weed, Anaconda Co., New York; Frank Nugent, Freeman Coal Mining Corp., Chicago. J. D. Conover is executive vice president and secretary.

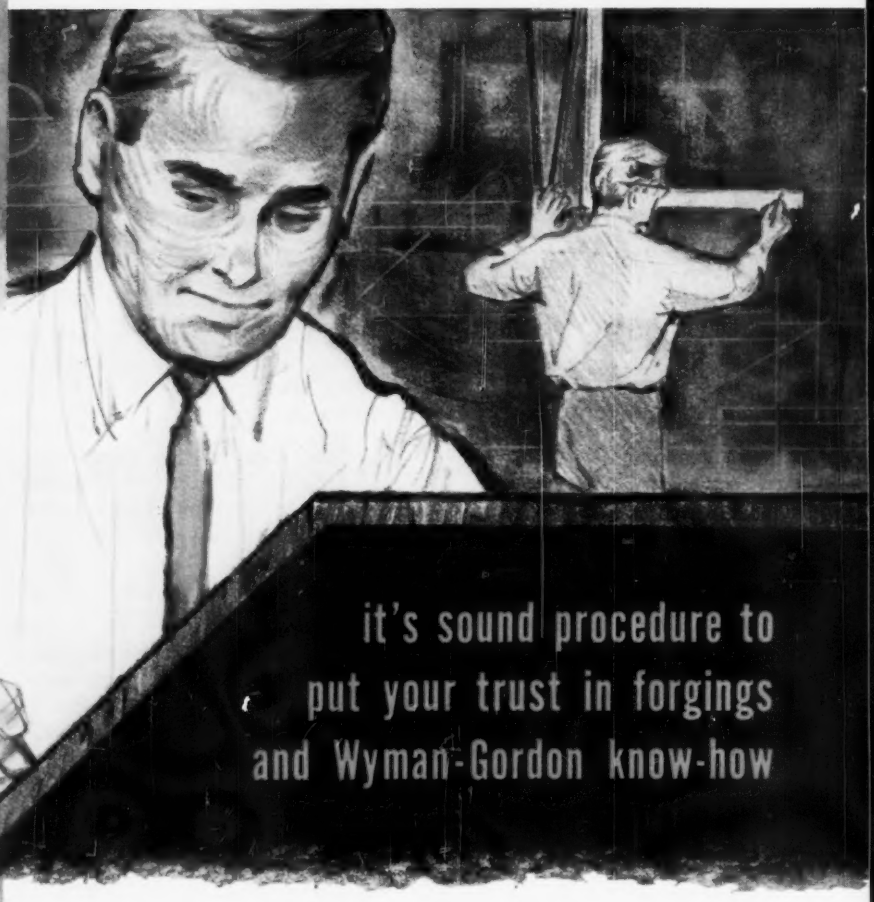
American Institute of Steel Construction, New York, elected these officers: President, H. G. Lewis, Flint Steel Corp., Tulsa, Okla.; executive vice president, J. K. Edmonds; first vice president, R. C. Palmer, R. C. Mahon Co., Detroit; second vice president, J. P. Murphy, Yuba Consolidated Industries Inc., Emeryville, Calif.; treasurer, E. P. Stupp, Stupp Bros. Bridge & Iron Co., St. Louis; and secretary, M. Harvey Smedley of New York.

National Association of Corrosion Engineers, Houston, elected these officers: President, Rolland McFarland Jr., Hills-McCanna Co., Chicago; vice president, C. G. Munger, Amercoat Corp., South Gate, Calif.; and treasurer, C. G. Gribble Jr., Metal Goods Corp., Houston. T. J. Hull is executive secretary.

Caster & Floor Truck Manufacturers' Association, Chicago, elected these officers: President, D. F. Adams, Colson Corp., Chicago, vice president, R. D. Mount, Bassick Co., Bridgeport, Conn.; and treasurer, D. B. Anderson, Nagel-Chase Mfg. Co., Chicago.



DESIGNING FOR GREATER RELIABILITY



it's sound procedure to put your trust in forgings and Wyman-Gordon know-how

Forgings simply have no "or equal" in meeting the tight specifications on reliability a designer must write today. Take your metallurgist's word for that. No other process he knows of can make such basic contributions to part integrity . . . develop physical properties to such optimum values . . . or control vital grain flow with like precision. For no other method approaches forging in the consistent soundness and superior metal quality needed for unfailing performance. As a forging supplier, Wyman-Gordon is equally outstanding . . . offering unduplicated hot-working experience, materials knowledge and facilities which substantially extend design latitude in solving product reliability problems.

WYMAN-GORDON

FORGINGS

of Aluminum Magnesium Steel Titanium . . . and Beryllium Molybdenum Columbium and other uncommon materials

HARVEY ILLINOIS WORCESTER MASSACHUSETTS GRAFTON MASSACHUSETTS

DETROIT MICHIGAN LOS ANGELES CALIFORNIA PALO ALTO CALIFORNIA FORT WORTH TEXAS

W04

Technical Outlook

BIGGER TUNGSTEN SHEETS—General Electric's new refractory metals plant, Cleveland, will produce pure tungsten sheets 24 in. wide in thicknesses from 0.010 in. to 0.5 in. (In six weeks, foil down to 0.0005 in. will be available.) Some evidence is available to indicate that the sheets are more ductile than earlier material. The firm attributes that to knowhow gained in the manufacture of tungsten lamp filaments.

PINPOINTING TEMPERATURES—The National Bureau of Standards, Washington, has modified the bridge of a standard, Mueller, resistance thermometer so that accurate dial indications can be made in steps of 1 microhm. Stability and measurement accuracy are thus improved ten times, states the bureau.

TIN AIDS NICKEL—Small quantities of tin (up to 5.7 per cent) markedly improve the creep resistance of nickel, state Drs. P. W. Davies and J. P. Dennison, University College, Swansea, England. Creep ductility is not adversely affected until the limit of solid solubility of tin in nickel is exceeded.

OXYGEN PROCESS FOR ALLOYS—The L-D process may soon be employed in the production of alloy steels, states VOEST, Linz, Austria, the originator. L-D is already at work in 34 steel plants throughout the world making regular steels.

GLASS LUBRICANT—A plant for extruding long carbon steel tubing is being set up in France by Loraine-Escaut. The glass lubricating system was developed by CEFILAC, a subsidiary of Ugine.

YTTRIUM NODULAR IRON—Yttrium is a good nodulizer for cast irons, the American Society of Mechanical Engineers has been told. Crane Co., Chicago, says yttrium nodular iron meets strength and ductility requirements of standard specifications. The firm lists these advantages: Yttrium eliminates flash losses; such castings are less sensitive to chill problems; have a wide range of effective nodulizer concentration; heat treat easily, and there is less retention effect upon remelt. In addition, says Crane, less process control is required, and foundry routine isn't disrupted where production is not continuous.

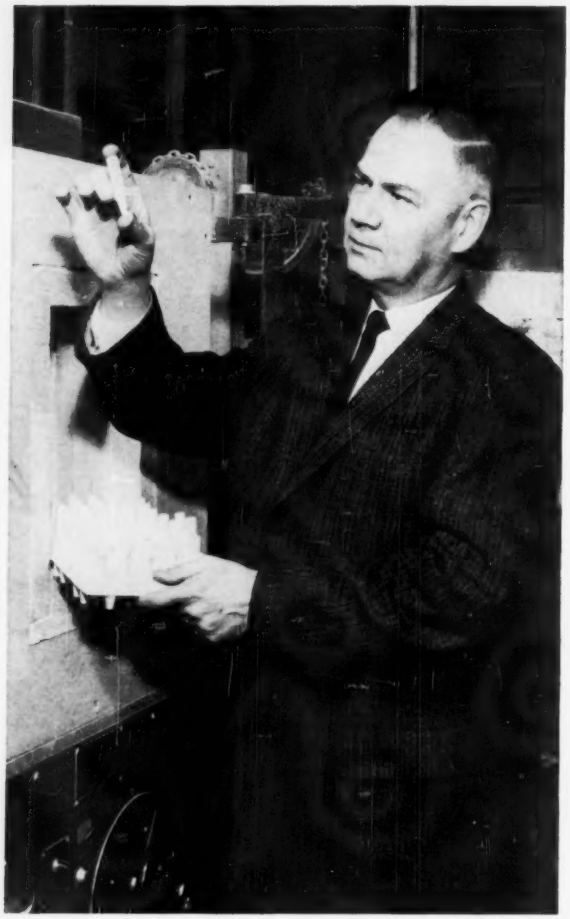
TUNGSTEN DEVELOPMENT—Single crystals of tungsten and tungsten alloys grown by an arc modification of the Verneuil process can be rolled, swaged, or forged at temperatures 900 to 1200° F lower than normal for ordinary tungsten, says Linde Co., a division of Union Carbide Corp., New York. High purity single crystals have brittle-ductile transition temperatures below room temperature when surfaces are prepared properly, the firm states.

OXYGEN PROBLEM—The temperature of molten steel plays a major role in determining the amount of oxygen retained in finished steel, the American Institute of Mining, Metallurgical & Petroleum Engineers was told at its Fall Electric Furnace Conference. It is possible to lower the oxygen level in a ladle only to have more picked up during pouring.

RUSSIAN STEEL—The USSR is employing a low alloy steel with 0.08 to 0.09 per cent vanadium in railway cars, says Edgar Allen & Co. Ltd., Sheffield, England. Advantages claimed for the alloy in car construction are being checked.

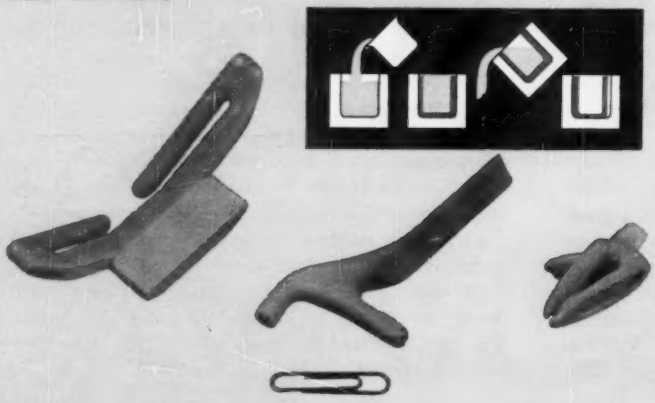
DYNAMIC TESTING OF RUBBER—"An approach to rubber testing and compounding based on the measurement and control of rubber's dynamic properties has been of considerable value in our efforts to improve process controls and existing products," says Matthew Fleming, president, Clevite Harris Products Inc., Milan, Ohio, subsidiary of Clevite Corp. Using the technique, the company hopes to bring the usual 30 per cent variation in rubber properties down to less than 5 per cent. The testing program was developed during a research project that produced the Clevebloc prelubricated bearing or the 1962 Rambler steering system.

New Materials, Techniques Increase Versatility Of Ceramics



How Ceramic Parts Are Formed

SLIP CASTING



. . . relies on a plaster mold which absorbs moisture from a ceramic slurry, depositing solids against the outer wall as shown. As soon as the right thickness is obtained, the rest of the slurry is poured off. When dry, the part shrinks, permitting removal. Thread guides (below) are typical parts.

This description of the properties and uses of some available ceramic materials is based on information prepared by Carl F. Schaefer for the General Motors *Engineering Journal*. Mr. Schaefer is supervisor of ceramic research, research laboratory, AC Spark Plug Div., General Motors Corp.

• CERAMIC MATERIALS, now available in a wider-than-ever range of properties, are being used to solve engineering problems. In the process, they may aid metalworking plants, or may take over jobs once reserved for metals.

Two things broadened the horizons for ceramics—the introduction of new materials and improvements in manufacturing methods.

Ceramics are no exception to the problem of definition, common to materials that cover a broad range of compositions and properties. But since ceramics are primarily oxides, they have the basic property of stability: Their physical properties are not readily changed, nor do they react easily with elements in their environment.

• Here are some of the properties of interest to users:

• High compressive (but not tensile) strength—which can be varied.

• A wide range of hardnesses.

• Thermal expansion—it's usually slight, but it can be as high as that of some metals (or even negative), permitting ceramic-to-metal joints that hold a vacuum.

• Thermal conductivity—it's usually low, but beryllia ceramics are good heat conductors.

• Electrical properties—most are insulators; some are semiconductors.

• Temperature resistance — good chemical stability prevents breakdown, and ceramics with slight thermal expansion are not sensitive to heat shock.

With the growth in the number of raw materials from which to choose, and the possibilities inherent in combinations of materials, ceramic technology is now closer to that of metals and alloys. As with the metals, combinations of the basic ceramic materials can be made with properties or costs that would not otherwise be possible. And, generally, higher purity is more costly, so the best choice involves engineering economics as well as ceramic technology.

• Growing interest is being shown in the group of ceramics based on alumina (aluminum oxide, Al_2O_3).

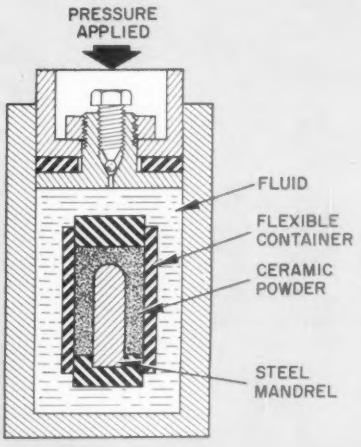
In the dense form, they have high compression strength, extreme hardness, moderately high thermal conductivity, and good refractory properties.

The proportion of the alumina in the ceramic "body" will affect its properties, as will the residual porosity. Commercial compositions range from 85 to 100 per cent alumina. As with other materials, many properties of the ceramics drop as the temperature is increased, and the alumina based compositions are no exceptions. But they do not decline rapidly, so they are used to withstand heat and high frequency current.

The high strength and hardness of the alumina ceramics result in applications such as gage blocks and machine parts. With hardness in the range of the cemented carbides, the alumina refractories are usually lighter. They can be machined and ground to close tolerances and good surface finish. Alumina parts are resistant to heat and many types of chemical attack,

ISOSTATIC MOLDING

. . . confines the ceramic powder and mandrel in a flexible container, applies pressure hydraulically to compress the material into a self-sustaining blank. Such parts are generally machined to produce the right finish and contour.



Physical Properties of Some Dense, Fine Grained Ceramics

Properties	95 to 100 % Alumina	85 % Alumina	Beryllia	Zircon Porcelain	Lithium-Alumino-Silicate
Modulus of Rupture (1,000 psi)	45 to 60	35 to 45	32 to 36	13 to 26	8
Compressive Strength (1,000 psi)	300	200 to 300	225	60 to 100	60
Tensile Strength (1,000 psi)	25 to 35	28 to 32	—	7 to 12	—
Impact Resistance (in.-lb)	7 to 8	6 to 7	—	5 to 5.5	—
Modulus of Elasticity (1,000 psi)	40 to 50	28 to 32	46	—	—
Hardness (MHO Scale)	9	9 to 9	—	8	—
Thermal Expansion Coefficient (X 10^6 per °C)	7.0 to 8.0	6.5 to 7.5	9.2 to 9.4	4.5 to 5.0	1.15
Maximum Service Temperature (°F)	2,370 to 3,090	1,830 to 2,640	—	2,010 to 2,370	0.005

as well as to galling under load. So they are applied as seal rings and pump parts for handling corrosive or abrasive liquids, thread guides, precision bearings, and gyroscope parts. Alumina cutting tools make use of the hardness and strength of the material.

Alumina ceramics are used where ceramic-to-metal seals are needed. Metals can be matched to the expansion characteristics of the alumina ceramic, but in addition, many ductile metals can be sealed to these materials because they have the mechanical strength to withstand the forces set up by the differential expansion. Alumina has been used as the envelope for vacuum tubes.

Temperature resistance and chemical inertness of the alumina ceramics have been responsible for their use in heat exchangers and as refractory linings for metallurgical equipment. Other applications include: Sand blast nozzles, radomes, and grinding media.

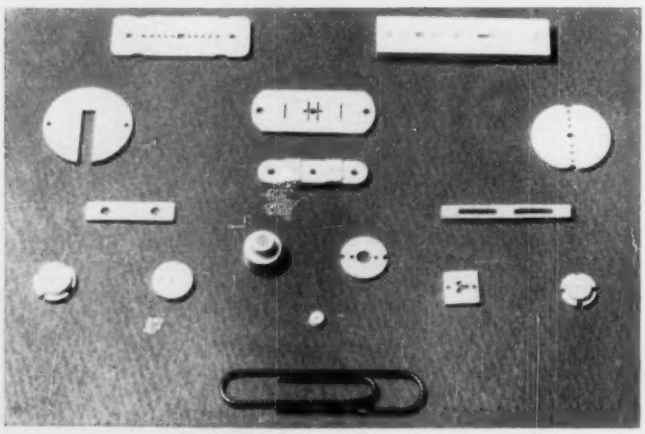
• While alumina is one of the important ceramic materials, other single (or pure) oxides have valuable properties.

Pure ceramic products are prepared by the chemical processing of the raw materials before they are shaped into the finished parts, much as it is necessary to refine ores, or metals in the molten state rather

How Ceramic Parts Are Formed — continued

PRESSING

. . . makes small, intricate parts like those shown at right. Opposing rams press the loose material into a compact, dense part. Usually one ram ejects the pressed part after the opposite one is withdrawn.

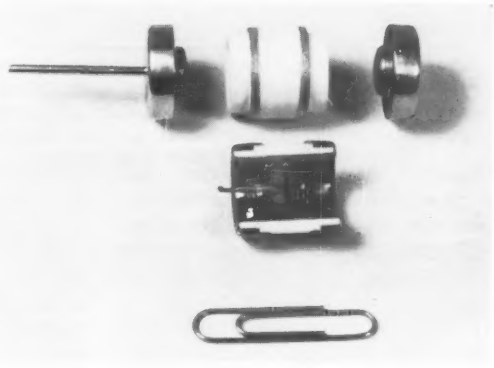


	Magnesia	Pyroceram	Feldspathic Porcelain	Steatite	Forsterite	Titania	Cordierite
	20	16 to 23	9 to 12	18 to 20	20	20	15
	90	—	40 to 90	75 to 90	85	100	50 to 95
	—	—	3.3 to 4.5	7.5 to 10	10	7.5	—
	—	—	2.6 to 4.8	4.3 to 5.0	4	6.5	4.0 to 4.4
	36	12.5 to 17.3	10 to 15	—	—	—	—
	—	—	6 to 8.5	7.5 to 8.0	7.5	8	7.5 to 8
	10.1	0.04 to 5.7	3.8 to 6.0	7.0 to 9.0	10.5 to 11.0	10	3.3 to 4.1
	—	—	1,830 to 2,370	1,830	1,830	1,830	2,190

than as finished parts.

Beryllia, or beryllium oxide, while relatively expensive, has high thermal conductivity. At room temperature, it is about as conductive as aluminum, but it is an electrical insulator. It has good strength and resists thermal shock. While unreactive chemically, it is toxic in the finely divided form; after firing, there is little hazard in handling the product.

Other pure oxide ceramics include zirconia, which is used for crucibles because of its resistance to chemical attack and ability to withstand high temperatures; titania is sometimes used for thread guides if there is a static problem because it can lead a static charge to ground; magnesia is a highly refractory material with good thermal conductivity and high electrical resistance, making it a good insulator for electrical heating elements.



Typical electronic tube assembly has ceramic insulators soldered to metal plates and conductors. Such seals must be gastight

EXTRUSION

. . . operates as it does with metal parts—cross sections must be symmetrical. Plastic ceramic material is placed in a cylinder. A piston forces the material through a restricted die section. Core pins can be mounted in the die to produce holes.

• Many of the older and more common ceramic materials are mixtures or combinations of several oxides. Porcelain is an example; others are steatite, forsterite, and other silicates.

Steatite is predominately magnesia and silica. It is used for many

Physical Properties of Some Porous, Fine Grained Ceramic Materials

Properties	100 Per Cent Alumina	Cordierite	Lithium-Alumino-Silicate	Zirconia
Modulus of Rupture (1,000 psi)	8 to 22	6 to 8	4.2	4
Compressive Strength (1,000 psi)	10 to 80	30 to 60	6 to 20	10
Tensile Strength (1,000 psi)	—	2.4 to 3.5	—	—
Impact Resistance (in.-lb)	3 to 4	2.2 to 2.5	—	4
Specific Gravity (Bulk)	2.4 to 2.6	2.0 to 2.1	—	2.9
Thermal Expansion Coefficient (X 10^6 per °C)	6.5 to 8	2.8 to 2.9	0.63 to 0.65	9.6
Maximum Service Temperature (°F)	2,370 to 3,090	2,280 to 2,310	2,010 to 2,370	2,900

types of electrical insulators. Its virtues include ease of fabrication, low cost, and properties that can be adjusted within wide limits. Intricate shapes are often made of steatite.

Porcelain for electrical uses is a mixture of clay, silica, and feldspar. Production methods are similar to those used for household porcelain; raw materials are not costly, and they are easy to fabricate. So these materials are often chosen where the special properties of the more expensive ceramics are not needed.

Low, or even negative, thermal expansion can be obtained by using silica and alumina with magnesia or lithia. Such ceramics are practically immune to thermal shock; they can be repeatedly quenched in water from a red heat. While they are not as refractory as other ceramics (they're limited to about 2400° F), they are used as heater supports, burner tips, and as welding jigs and fixtures.

But without the magnesia or lithium oxide, the combination of silica and alumina (known as forsterite) has high thermal expansion. It is close enough to that of iron, so that the two can be joined, and thus permit sealing a metal conductor through a ceramic wall. It is used for power tubes and other electronic needs.

Nucleated ceramics, such as Pyroceram or the nonmetallic portion of Nucerite (a ceramic-metal composite) are made by an unusual method. They are processed like glass, then given a heat treatment that causes crystallization. The nature of the crystallized product depends on the "glass" composition and the heat treatment. They are uniform, have high electrical properties, and good shock resistance. Their strength is less than that of alumina.

• Porosity, usually avoided in ceramic manufacture, is deliberately developed for some requirements. It must be predictable.

Porosity is controlled by the manufacturing method; it is not dependent on the base composition of the materials. Since the mechanical properties of the porous bodies are lower than those of similar dense shapes, they are used only where the porosity is an advantage. An example is insulating brick, which combines lightness with low thermal conductivity; another is the porous filtering devices used in fuel lines or water supplies.

In vacuum tubes, porous ceramic internal supports permit faster removal of gases, lengthening tube life.

An interesting application: Porous ceramics are used in the manufacture of thermocouple probes and electrical heating elements. Here the ceramic is extruded in tubular form. The wire is inserted, the unit placed in the metallic sheath, and the unit is swaged. The operation forces the sheath into contact with the ceramic, crushing it, and the crushed ceramic in turn is in close contact with the internal wire or wires. The unit combines good thermal conductivity with the electrical resistance necessary to prevent losses.

Porous ceramics are used for cores in metal casting. The porosity permits the core to "give" as the casting cools, and, in addition, aids in subsequent removal. The core is removed by a molten salt, and the porosity aids penetration as well as reducing the amount of material that needs to be dissolved.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Wire Helps Trim Product Costs

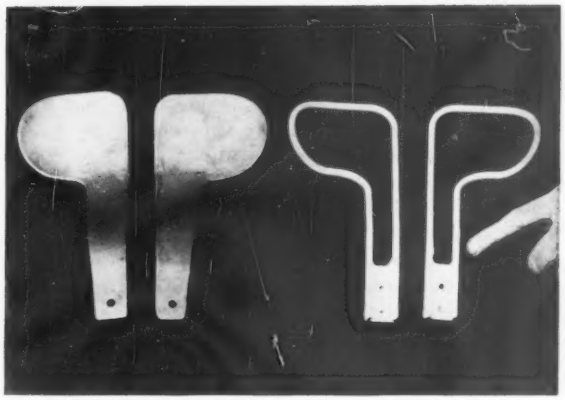
PERHAPS the best single place to achieve substantial reduction in costs of manufacture is in the initial product design stage.

E. H. Titchener & Co., Binghamton, N. Y., tries to find cost cutters for their customers by switching designs to incorporate formed wire parts.

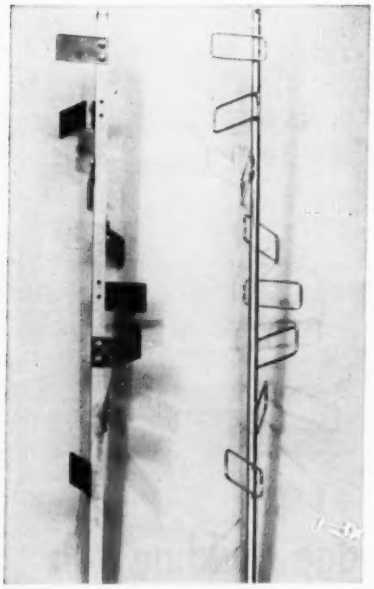
Major savings, the company says, fall into four distinct categories:

1. Tooling costs for the wire parts may be less than half the cost for the formed, cast, or molded components.
2. Skeletonized construction of the wire technique slashes material costs.
3. Since wire parts often can be made automatically, handwork and assembly steps can be reduced or even eliminated.
4. A reduction in part weight cuts product weight and shipping costs.

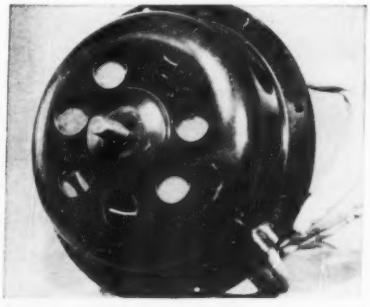
Four examples of the wire approach to cost cutting are illustrated here.

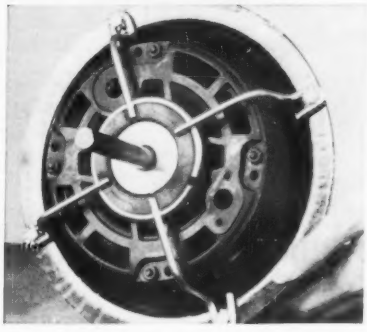


A hospital equipment manufacturer switched from solid bronze paddle arms (left) to plastisol-coated stainless steel wire parts. The change brought unit cost down 70 per cent. Weight was cut from 14 to 4 ounces. The new blades are quieter than their predecessors

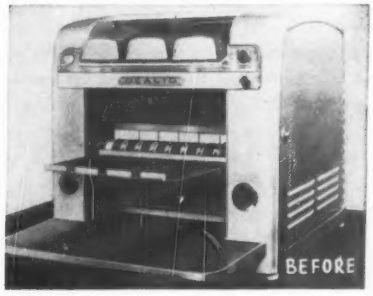


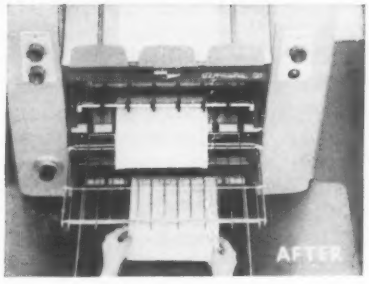
The welded wire dispensing flipper (right) for a vending machine costs only a third as much as the former nine-piece assembly (left) that was made from a machine steel rod and eight spring steel fingers, each fastened with two screws. Now, wire loops that form the flippers are resistance welded to the shaft





The deep drawn and perforated motor mount (top) for a General Electric room air conditioner was replaced by a wire mount (bottom). Saving: 20 cents per unit. The wire mount also weighs 14 ounces less. Improved air flow betters motor cooling





An adjustable, welded wire unit has replaced a stamped, sheet metal unit as the paper receiving tray for this office duplicating machine. The wire tray costs less than the sheet metal unit, doesn't collect dust or paper clips, simplifies removal of sheets from the tray, and lets the operator see through to the lower rolls

Sales Tour Shows a Market For Low Cost, Tape Control

• **WHEN Pratt & Whitney Co. Inc. announced several months ago that it would make and sell a numerically controlled drilling machine for $8595, it also admitted two contingencies: 1. The price was based on the costs of manufacturing the machines with mass production techniques. 2. It would take a "mass market" to consume the quantities produced. (STEEL, Oct. 30, p. 68.)**

Now, says D. C. McCarthy, P&W president: "We are absolutely sure that our 'gamble' (if that's what it was) is paying off."

He gets part of his assurance from the results of a flying, pre-Christmas road show.

• **A series of machine introductions in major cities has proved to P&W's satisfaction that the market for low-cost numerical control is a big one.**

P&W took its show to six cities—San Francisco, Los Angeles, Chicago, Detroit, Cleveland, and New York—putting on four sessions in two days in each.

At each session, Mr. McCarthy outlined why P&W felt the Tape-O-Matic filled a basic industry need. Paul N. Stanton, vice president-marketing, explained the P&W approach to marketing the machine with guarantees, leasing, financing, trade-ins, and other sales provisions. He also told about some of the companies that had bought one or more of the machines.

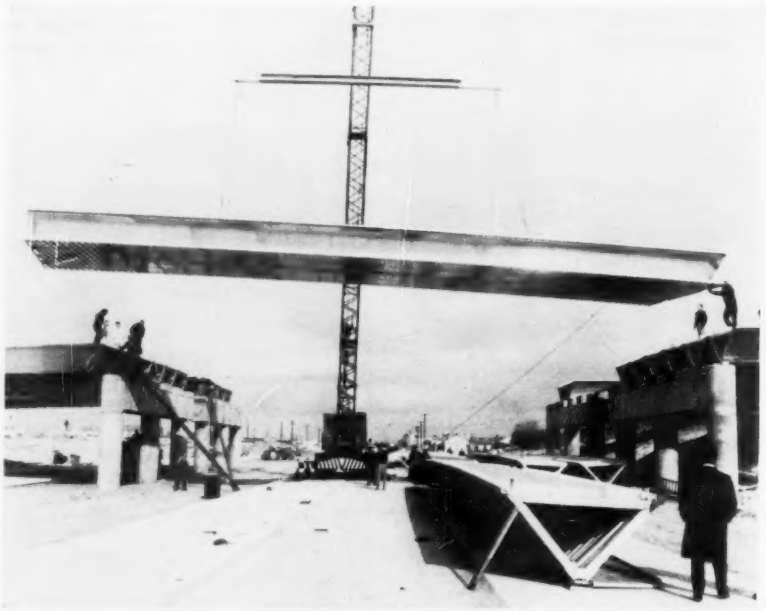
The sales job and machine demonstration were handled by James Daly, sales manager of the Machine Tool Div.; Frank Hale, chief sales engineer on the project; and Joe Salla, operator. A question and answer period followed.

Those who bought machines early in San Francisco were quoted February deliveries. First Chicago orders were quoted for March, but at the end of two days, deliveries were promised for April. At the end of the trip, the May order book was filled. And this is based on an output that will be measured not in conventional short lots, but in terms of "machines per day."

Both Mr. McCarthy and Mr. Stanton told STEEL they had achieved even more with the meetings and demonstrations than they had hoped for. The idea of showing the machine to thousands of potential users, particularly those from relatively small companies, was an essential part of launching it on the market. But the attendance (totaling about 7500), the interest, and the orders they received surpassed their expectations.

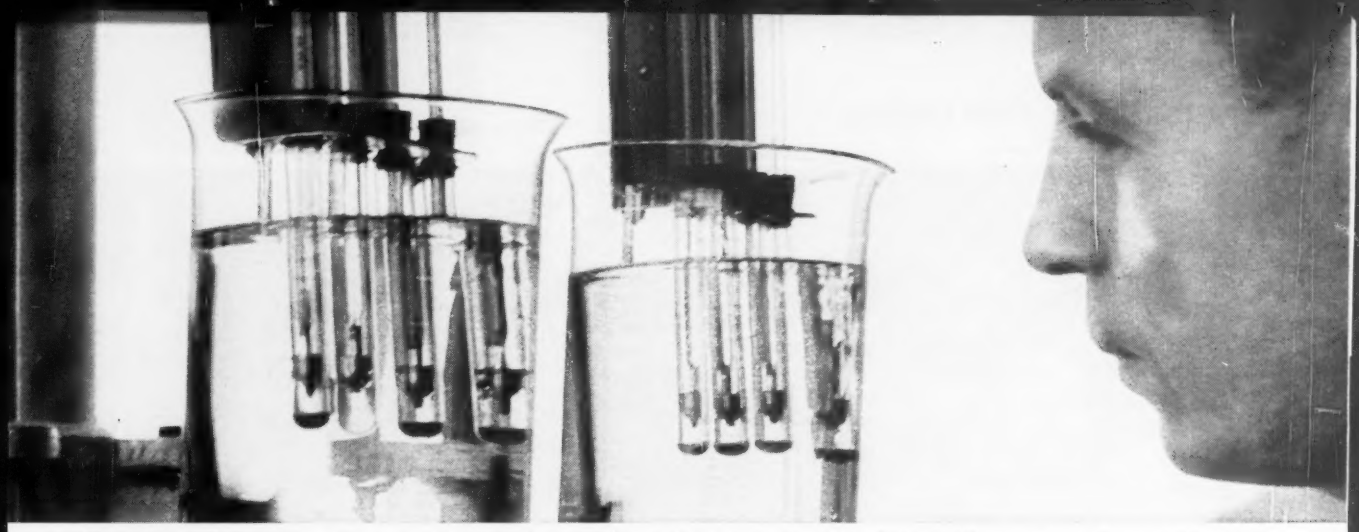
The road show will be taken to about 15 additional cities between now and spring. Machines will then be placed in distributors' showrooms for permanent demonstrations.

But there's no more wait-and-see talk about the machine. P&W managers are satisfied that the market is ready. They think they have proof.



Aluminum Lightens Bridge Building Job

PRINCIPLES of airplane wing design were incorporated into an aluminum bridge erected near Amityville, N. Y. Kaiser Aluminum & Chemical Corp.'s Unistress design employs components which are said to be easy and relatively inexpensive to fabricate and erect. Triangular beams are prefabricated from aluminum sheets and supported by aluminum extrusions. Each span can be lifted into position to form a deck for paving. Components for the Amityville bridge were fabricated at Frankfort, N. Y., by Traveler Mfg. Co.



Dropping point test shows how greases react to heat. Beaker fluid has been heated to 390°F. All greases tested except Darina (second tube from left) have passed from solid to liquid state.

BULLETIN:

Shell reveals the remarkable new component in Darina Grease that helps it save up to 35% on grease and labor costs

Darina® Grease is made with Microgel*, the new thickening agent developed by Shell Research.

Darina lubricates effectively at temperatures 100° hotter than most conventional soap base greases can withstand.

Read how this new multi-purpose industrial grease can help solve your lubricating problems and even save you up to 35% on grease and labor costs.

THERE IS no soap in Darina Grease. No soap to melt away—wash away—or dissolve away.

Instead of soap, Darina uses Microgel—a grease component developed by Shell Research.

What Microgel does

Because of Microgel, Darina has no melting point. It won't run out of gears or bearings.

Compared with most conventional soap-base greases, Darina provides significantly greater protection under adverse service conditions.

Mix water into Darina and the grease does not soften. It shrugs off water—won't emulsify.

Resists heat

Darina will withstand operating temperatures 100° hotter than most conventional multi-purpose greases. It cuts leakage and reduces the need for special high-temperature greases.

Also, Darina resists slumping, thus forming a more effective seal against foreign matter.

Saves money

Shell Darina can reduce maintenance expenses while it protects your machinery. Savings of up to 35% on grease and labor are quite possible.

In some cases lubrication intervals have been extended to double what they were before. Less grease is consumed and less time consumed applying it.

For details, see your Shell Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, New York.

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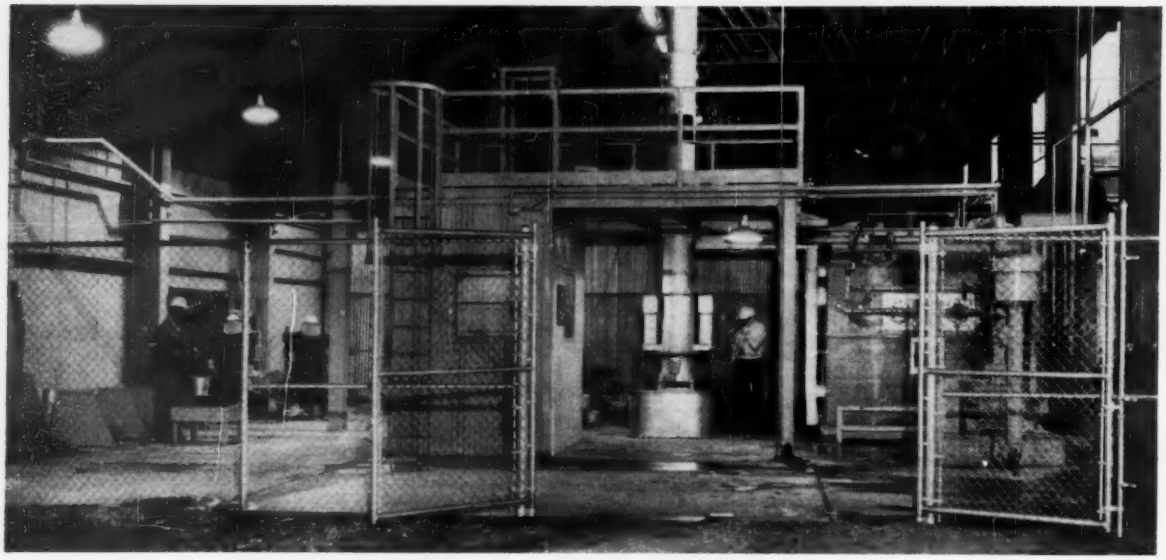
SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are helping to provide better products for industry



Gray iron melting facility is scaled down to laboratory size . . .

Foundrymen Offered Use Of Experimental Cupola

• A HOT BLAST CUPOLA with a 10 in. hearth has been put into operation by metallurgical department personnel at Hanna Furnace Corp., Buffalo, subsidiary of National Steel Corp. Its purpose: To provide more knowledge of gray iron chemistry and its correlation with physical characteristics in castings.

The cupola was built largely as a service facility for the company's gray iron customers. But Hanna Furnace personnel expect to learn more about physical properties and design possibilities of other materials, such as white, high alloy, and ductile irons.

• The laboratory size melting unit should stimulate increased research and development and help promote greater use of gray iron castings.

Hanna Furnace says: "We believe the building of our experimental cupola and the expansion of our laboratory services program to give founders more technical assistance on production problems will do much to improve the production and application of pig iron.

"We feel that such a program will help founders and their customers to take greater advantage of the benefits offered by castings. Some of those benefits are design freedom, low material and processing costs, good casting characteristics, and high yield of finished products per ton of hot metal (solidification shrinkage is 1.9 per cent or less)."

• Customers will be encouraged to solve their foundry problems with the test cupola, or to turn problems over to Hanna Furnace personnel.

"Most castings are specified for physical properties, rather than for chemistry," says Robert W. Carpenter, Hanna Furnace's chief service metallurgist. "The customer wants assurance the casting will meet the design goals of the end product. He isn't deeply interested in the chemistry. The foundryman's problem is to come up with the best possible chemistry to meet physical requirements at a realistic cost. That's where the test cupola should be of real value to our foundry customers.

"Starting with a basic concept for obtaining the desired physical characteristics (such as Brinell hardness and tensile strength), it will be a simple matter to make successive charge alterations in the small cupola, produce irons of different chemistries, and pour control pieces of each. The founder and his customer will benefit from the selection of an optimum product from a wide range of possible choices."

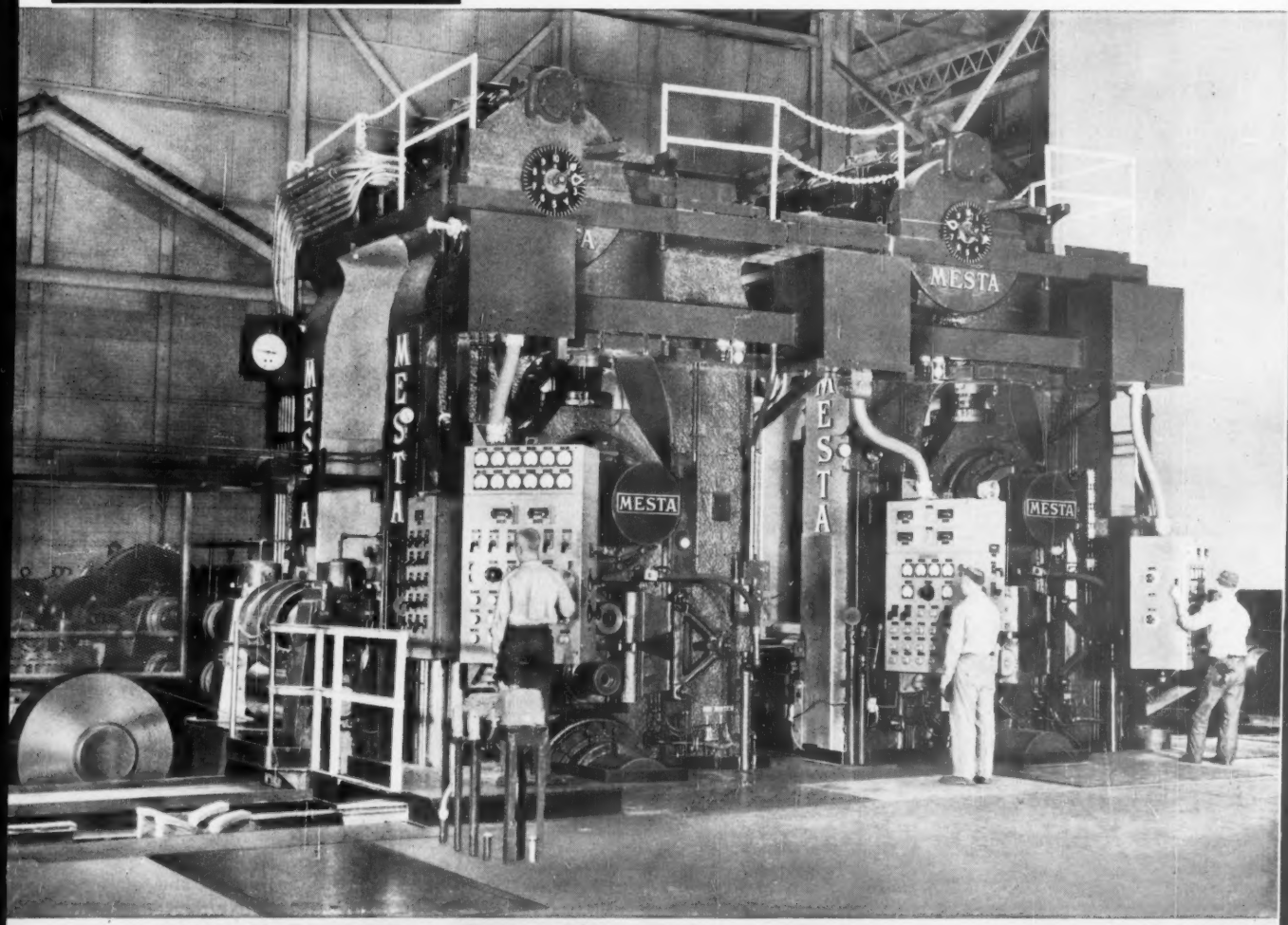
Mr. Carpenter says it isn't often practical for a founder to explore such a problem on a repetitive basis in his own plant. A one-time operation in a commercial size cupola would cost several thousand dollars in wages; it would divert equipment from production; and it would mean the use of 25 to 30 tons of metal.

"Metal costs in the experimental unit will be negligible," says Mr. Carpenter. "And founders will not be charged for use of the cupola."

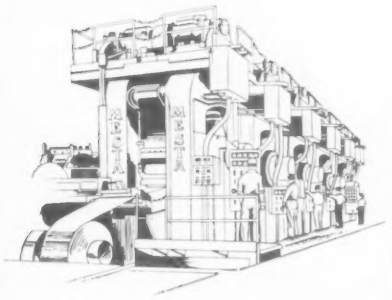
• Casting characteristics of new analyses can be studied before the iron is offered to customers.

The company expects the cupola to break information bottlenecks that have prevented the marketing

MESTA COLD MILLS



MESTA 51" Two-Stand Tandem Temper Mill Operating at the Yorkville Works of Wheeling Steel Corporation.

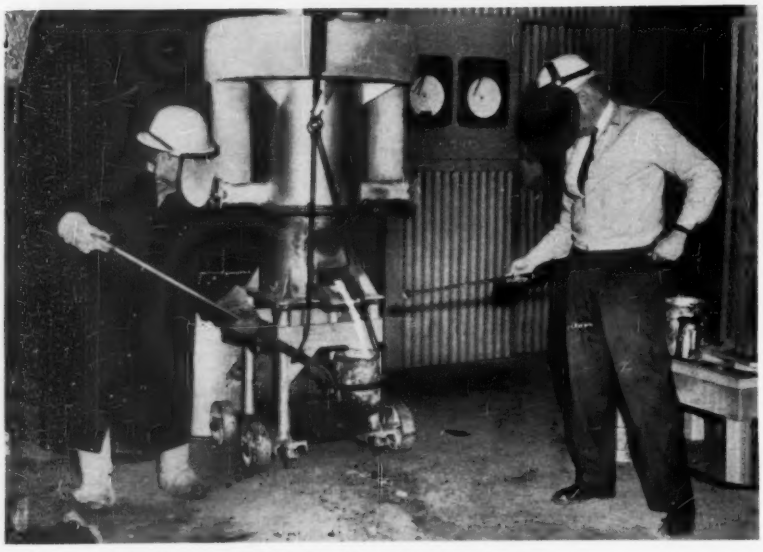


Designers and Builders of Complete Steel Plants

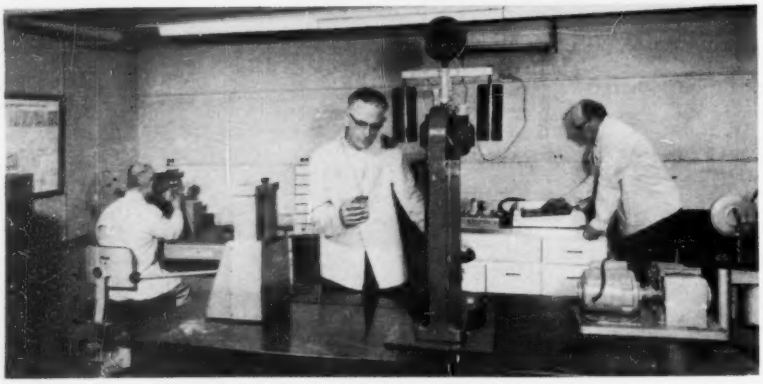
MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

Calculated charge is fed into the cupola . . .



Hot metal ladle is weighed before teeming . . .



Laboratory correlates casting characteristics, chemistry

of new types of iron.

"In addition to working with customers," says Mr. Carpenter, "Hanna Furnace will use the experimental cupola to explore every possible avenue to the development of better pig irons. Repetitive testing is the only practical means of doing that. And the cost of repetitive methods is prohibitive without a pilot operation.

"We have developed several new types of pig iron, which we believe superior in structure and physical properties. But unless the castings in which they are used reflect those improved characteristics, the irons have no commercial merit."

• The scaled down cupola, with its own source of blast air, will approximate the operation and product characteristics of a 60 in., cold blast unit.

The cupola melts about 600 lb of metal per hour, with a 7 to 1 coke ratio. Its hot blast system, which employs fuel oil burners and metallic recuperators, supplies air at temperatures up to 1000° F.

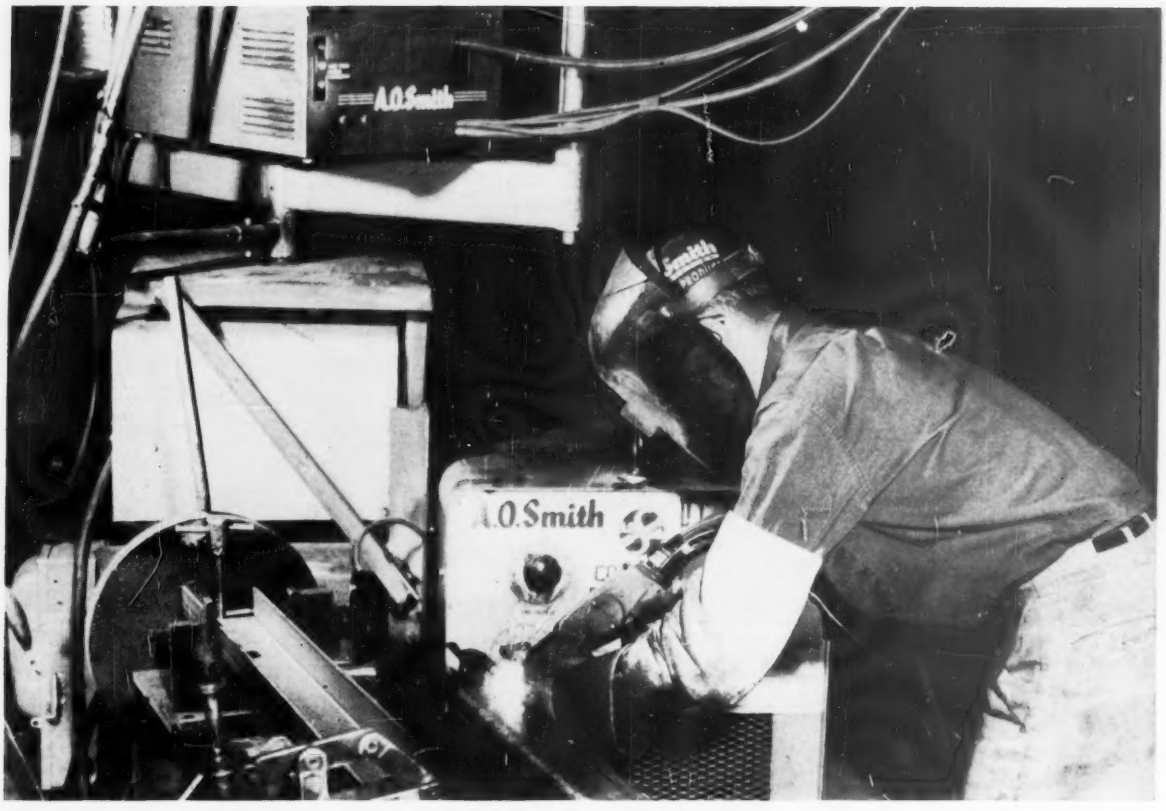
The weight and temperature of blast air (and windbox pressure) are regulated and recorded at all times. Those measurements and the accurate control of charge components possible in the small unit should make for repetitive, predictable cupola performance.

The unit, when operated with a 300° F hot blast, will closely approximate performance of a 60 in., acid lined, cold blast cupola, says Hanna Furnace. Variation of operating conditions should make possible reasonable duplication of customer cupola performance.

• Cupola operation and casting properties are closely correlated with results of laboratory analyses.

Charge materials are scaled down to sizes commensurate with the 10 in. hearth. Material analysis is carefully controlled, and all charges are weighed.

The product is cast in small pigs that can be recharged into the cupola—the closed cycle operation is said to minimize unknown variables. Portions of the product are cast in test molds to determine casting properties, such as chill rate and fluidity. Samples are sent to the laboratory for chemical analysis and physical property studies.



Operator joins tongue assembly of hay baler . . .

CO_2 Welding Speeds Farm Equipment, Ups Quality

• FASTER PRODUCTION and improved quality are the principal benefits of CO_2 shielded arcwelding, claims a farm equipment maker, New Holland Machine Co., New Holland, Pa., a division of Sperry Rand Corp.

"We have found the process enables us to achieve higher deposition rates, deeper penetration, and x-ray quality. In addition, the welds are 25 per cent stronger," states Galen Miley, New Holland's general foreman, in comparing results with E6024 iron powder electrodes formerly used.

• CO_2 units are utilized in more than half of New Holland's welding operations. More are being installed. Fixturing is important.

A principal factor of the firm's success in weld production is proper fixturing. Each fixture is designed for one operation to permit the most efficient welding position (downhand) with the least motion by an operator.

One of New Holland's products, a hay baler, is assembled on a 25 station line.

• Experts indicate that CO_2 continues to gain momentum in joining of structural steel members.

Some firms have reported speeds up to 300 ipm with CO_2 techniques tied to automatic fixturing. They noted these advantages for the process:

- Clean, relatively spatterfree welds (when properly adjusted).
- Low equipment costs compared with other arcwelding processes.
- For ordinary thicknesses, no joint preparation. The method will tolerate some dirt.

Speed of the system relies heavily on proper control, since seemingly minor voltage changes can cause wide fluctuations in weld quality.

Some firms also report that inexpensive fixtures work well.

• Feasibility studies of CO_2 welding were begun three years ago.

Following a trial run with a portable welder, New Holland bought two semiautomatics for a long term look at performance. The firm says that more units will be employed as soon as they can be adapted.

A. O. Smith Corp., Milwaukee, also points out that the CO_2 method is easily adapted to arc spotwelding.

With their beds mounted at right angles, two, tape controlled, traveling column drilling machines can work on the same part at the same time

Tape Control Breaks Bottleneck

• SIX, TAPE CONTROLLED drilling machines in a 14 man department are doing work that formerly required nine drilling machines and 22 men at Ingersoll Milling Machine Co., Rockford, Ill.

• ELECTRONIC STORAGE of program details, retrievable for inclusion in control tapes, has slashed engineering and programing costs by eliminating repetitive calculations.

The two complementary techniques pay a big dividend at Ingersoll. Its efficiency in the production of special machines is at a level normally restricted to the manufacture of repetitive, standard products.

Since most of the parts processed in Ingersoll's drilling department are one of a kind, the company rarely used drill jigs or fixtures. Hole patterns were laid out by hand on small parts.

The drilled holes were then used as patterns for the holes in the mating parts. Scheduling of the parts through the shop was complicated because mating parts had to arrive at the drilling department at the same time.

The technique also had some cost influence in assembly. When location or match of the holes was not precise, it had to be corrected. That took some time, and it also meant that the finished parts would not be in accord with blueprints—with a resultant replacement part problem.

Those things, says Ingersoll, led to delays, extra handling, and high labor costs.

• The revised drilling method had to cut the drilling costs, insure quicker delivery of machine tools, and guarantee that repair parts would be interchangeable.

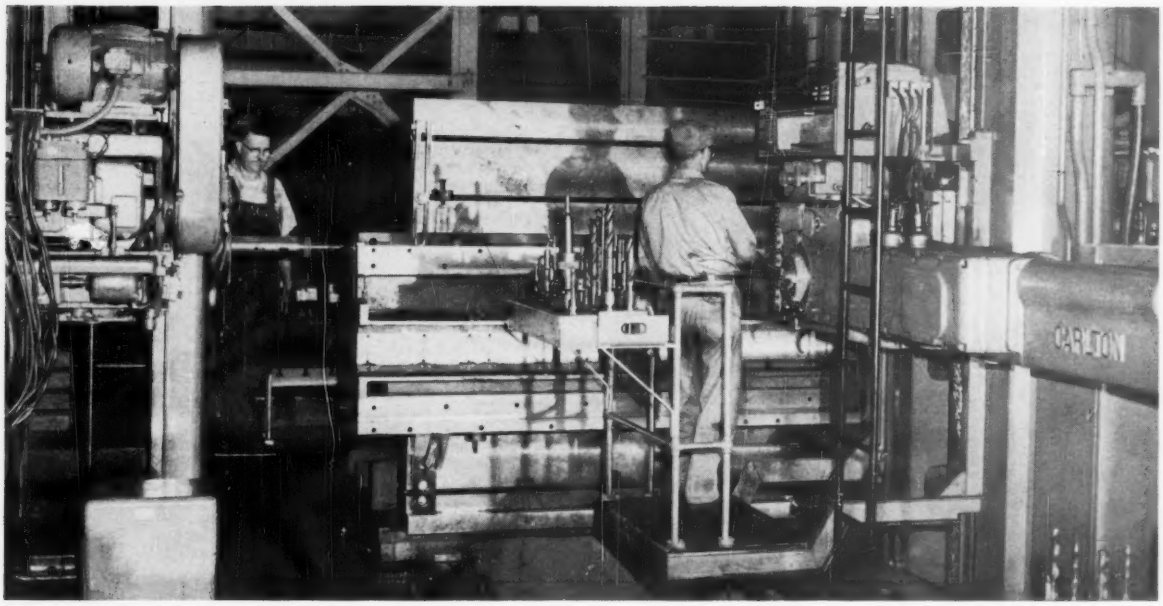
First, the company bought the six, tape controlled drills—two Burgmasters, one DeVlieg, and three Carltons.

Two, large, traveling Carltons are mounted with their beds at right angles. Tilt-up fixtures and rotary tables (designed and built by Ingersoll) are set in the angle between the two beds. The setup makes it possible to do all the drilling on the largest parts in two settings. It used to take at least four.

Here are the advantages gained: Scheduling of mating parts can be done for optimum efficiency; they do not have to arrive at the drilling department at the same time. Errors are rare. The few jigs the company owned have been scrapped. Drilling time has been slashed. Hand layout is eliminated, and excessive handling is a "thing of the past."

• Engineering costs had to be cropped.

Before tape control, engineers



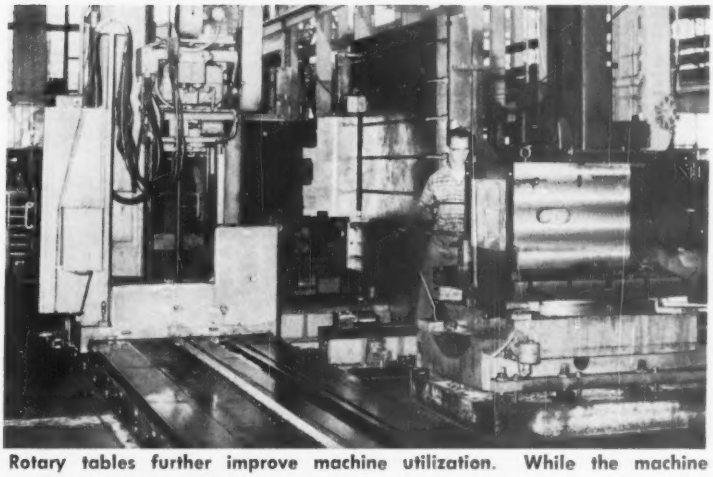
With the machines working simultaneously, the workpiece is set up on the tilting fixture only once for this job

specified hole patterns only on the parts that had to be drilled—not on the mating parts where the holes would be drilled and tapped. On the production floor, the men took care of putting matching holes in the mating parts.

With tape control the engineers had to dimension all the hole patterns in all the parts. That led to a significant increase in engineering time and cost, but it was essential since the pattern information had to be part of each control tape for the job.

The company solved that problem with electronic equipment that was being used for accounting. The pattern for a given set of holes is figured, as before, for one of the parts. The information is then programed and put into a Ramac machine for electronic storage.

The engineers then define a reference point on each part and locate the first hole in the pattern from that point. Each time a control tape is prepared, the reference point is programed, and then the pattern information is retrieved from the Ramac. As before, each hole pattern is figured only once—then it's electronically added to the control tapes as needed. Engineering time is about what it was before, and accuracy is better when the parts reach assembly.



Rotary tables further improve machine utilization. While the machine works at the tilting fixture, an operator sets up a part on the rotary table

Tools for each job are delivered to the operator on a roller conveyor in preassembled groups. Tape and setup instructions come with the tools

COORDINATED TREADWELL ENGINEERING

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Furnace side view of 21-inch 3-high merchant mill stand. Entry and delivery guides designed by TREADWELL. Cast of ductile iron in the TREADWELL foundry. Tilting tables supplied by TREADWELL, too. Designed, built and delivered on schedule by TREADWELL. We will do the same for you. See our equipment specialties listed below.

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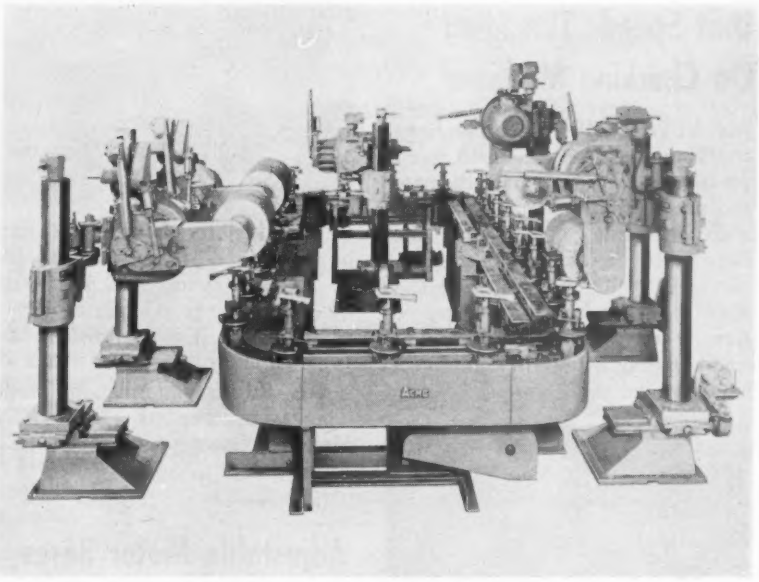
Compact Finishing Machine Efficient, Flexible

COMPACTNESS, efficiency, and flexibility are stressed in a finishing machine designed by Acme. With open center construction, finishing lathes can be placed on the inside as well as the outside of the machine to finish both sides of a part simultaneously. The design also reduces the length of the machine and cuts the amount of camming required.

Polishing or buffing is performed by separate, adjustable lathes placed around the periphery of the conveyor unit. Each lathe can be provided with buffs, for wide or tangent wheel buffing. Polishing wheels or abrasive belt heads can also be used to perform the desired finishing.

For further information, *write* Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20, Mich.

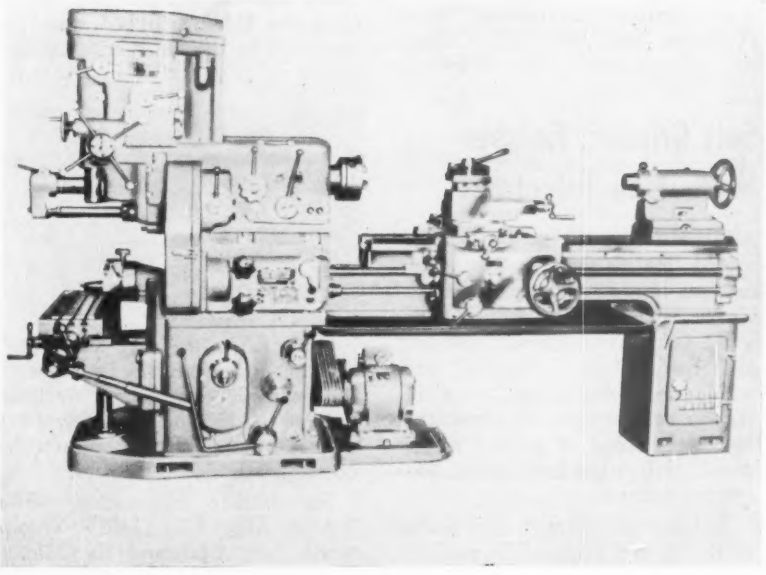


Five Functions Combined into One Machine Tool

A COMPACT tool design by Bromfield combines a lathe, shaper, vertical miller, horizontal miller, and drill press into one machine.

The lathe bed is 8 ft 4 in. long and 16 in. wide. Center height is 10½ in. with a 31½ in. (diameter) swing over the gap. Drill capacity is 2 in. with an 18 in. swing. The shaper has a 16 in. ram stroke. The milling table measures 10 x 27½ in. with a horizontal feed of 14 in. and a vertical travel of 21½ in. A 5 hp motor (built in) furnishes power for all operations.

Two operators can use the unit simultaneously. The combination makes possible substantial savings in initial cost, erection, maintenance, weight, and floor space for many applications including maintenance and repairwork. The manufacturer

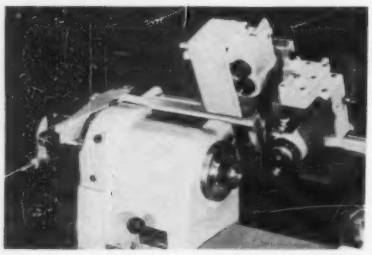


says the unit is comparable to the average single unit tool for precision, rigidity, simplicity of operation, and lifetime expectancy.

For further information, *write* Bromfield Corp., 256 Border St., East Boston, Mass.

Unit Speeds Threading On Chucking Machines

AN ATTACHMENT for Hardinge chucking machines is said to speed production threading and eliminate the need for skilled operators. The automatic unit goes through the same threading motions as the previous, manually operated, threading unit. It uses a lead screw mounted directly on the headstock spindle and a mating follower. No intervening gears are used.



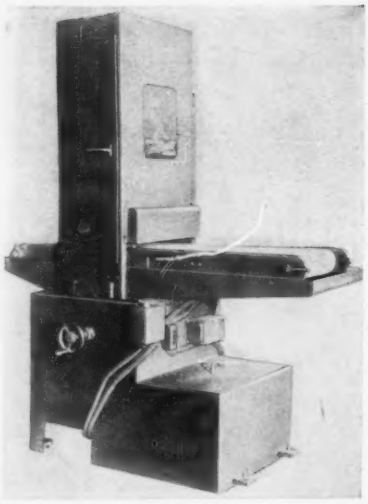
The attachment is air actuated and electrically controlled. It's available on new Hardinge chuckers as well as for existing machines (without machining the headstock).

For further information, *write* Hardinge Bros. Inc., 1420 College Ave., Elmira, N. Y.

Belt Grinder, Finisher Holds Fine Tolerances

ANOTHER model has been added to the line of abrasive belt grinders and finishers offered by Timesavers Sanders. The unit (TOP-VW) is designed for wet grinding and has a built-in coolant tank with recirculating pump. Fine tolerances can be held. It's adaptable to the finishing of printed circuit panels and to flat ferrous and nonferrous surfaces.

You can get abrasive belt widths of 12, 18, and 30 in. The machine



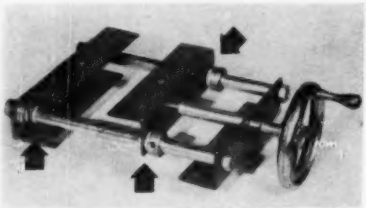
features feed speeds of 2 to 6 fpm or any desired 3:1 ratio, belt speeds of 2500, 4000, or 5500 spm, and quick belt change to minimize downtime. The belt is oil resistant and is powered by a separate motor.

For further information, *write* Timesavers Sanders Inc., 5270 Hanson Court, Minneapolis 22, Minn.

Adjustable Motor Bases Have Smooth Traverse

QUICK, simple speed adjustment for fractional horsepower drive assemblies using variable pitch sheaves is cited as a feature of the Rampe SB motor bases.

Nylon bushings in the sliding rails insure smooth traverse movement. Crosswise binding in bed travel is prevented by the self-lubricating action of nylon on the rigid guide rods.



Other features: Heavy duty screw adjustment and handwheel operation with locking collars to limit bed travel. Precision screw threading assures smooth, positive takeup without backlash.

For further information, *write* Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

NEW literature

Write directly to the company for a copy

Hydroxyacetic Acid

Properties and applications of hydroxyacetic acid are described in a technical bulletin. Applications for the material include electroplating, electropolishing, metalworking, and uses in the petroleum industry (such as emulsion breaking and oil additives). Public Relations Dept., E. I. du Pont de Nemours & Co., Wilmington 98, Del.

International Operations

Development of International Operations Through Direct Foreign Investment, a 43 page booklet, gives basic investment information for 13 nations. Pegasus International Corp., 41 W. 57th St., New York 19, N. Y.

Plastics in Bearings

How to Use Plastics for Bearings Repairs is a comprehensive discussion. Stock shapes of nylon, acetal, and Teflon are covered along with plastic shaft replacement. The booklet also outlines conditions under which plastic bearings may work better than metal bearings. Cadillac Plastic & Chemical Co., 15111 Second Ave., Detroit 3, Mich.

Columbium Alloy

Columbium alloy B-33 for high temperature applications is discussed in a bulletin, No. 52-264. Materials Mfg. Dept., Westinghouse Electric Corp., P. O. Box 128, Blairsville, Pa.

Filmbadge Monitoring

A bibliography on filmbadge monitoring has been prepared for the U. S. Atomic Energy Commission. St. John X-Ray Laboratory, Califon, N. J.

Properties of Beryllium

A comprehensive collection of data on beryllium is intended to benefit designers in the fields of aircraft, missiles, and nuclear engineering. Ask for *Properties of Beryllium*. General Astrometals Corp., 320 Yonkers Ave., Yonkers 2, N. Y.

NEW BOOK

New Patterns of Management, Rensis Likert, McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36, N. Y., 279 pages, $6.95.

This book is based on major findings of a research program by the Institute for Social Research, University of Michigan. It summarizes the principles and practices employed by successful managers, then proposes a management system based on those principles. It emphasizes the use of measurements to guide decision making and discusses some methods for obtaining the necessary measurements.

Buyers Wary of 1959 Mistakes

LESSONS learned three years ago may help steel users avoid repeating in 1962 the mistakes they made during the 1959 scramble to build strike-hedge inventories.

In 1959, few buyers gave serious consideration to their inventory programs until February or March. By then, the outlook for successful steel labor talks had deteriorated to such an extent that thousands of steel users reached the same conclusion simultaneously: There might be a long, long strike.

In their frenzy to build inventories, many tried to order double and triple quantities. When they were turned down by regular suppliers who found it necessary to establish quotas, they bought from brokers at premium prices, made costly conversion deals, or signed long term agreements with foreign mills. They paid too much for their steel and found that some of it was of such poor quality that it could not be used.

STARTING EARLIER— This year, users are determined to start earlier and to spread their order releases over six months, adding about the same increment to their stocks each time. The Big Three automakers started laying the groundwork for their inventory programs in November.

MILLS ALSO PREPARE— By giving the mills advance notice of their first half requirements, users are helping to minimize the threat of spot shortages. Steelmakers have been preparing for a surge of demand in the first quarter by stockpiling semifinished material. When orders start piling up, they'll have hot bands available for quick finishing and prompt delivery. The buildup of mill inventories is one of the reasons why steel production has increased so sharply since Thanksgiving. Output during December will be at least 9.7 million ingot tons. That's 1 million tons more than steelmakers poured in December, 1958, only a few months prior to labor negotiations.

CONSUMPTION HIGHER— The main reason production is higher this December than it was three years ago is that consumption is up. Automakers will build more than 1.8 million cars this quarter. In the like quarter of 1958, they built less than 1.4 million. Also indicative of higher consumption: Factory shipments of electrical appliances are running 1.4 per cent ahead of last year's. The Federal Reserve Board's index of industrial output climbed to a record high last month—114 per cent of the 1957 average.

EXPORTS, IMPORTS RISE— Exports of steel mill products climbed to 208,000 tons in October, an 11 month high. Commerce Department officials attribute most of the 43,000 ton advance from September's figures to shipments to Pakistan and Liberia, financed by U. S. government aid. Imports in October were 335,000 tons (vs. 269,000 tons in September). Exports in the first ten months of the year were 1.6 million tons, about 1 million tons less than they were in the like period of 1960. Imports in ten months were 2.5 million tons, off 400,000 tons from a year ago.

PRODUCTION DIPS— Look for ingot production in the week ending Dec. 30 to be slightly lower than the 2,230,000 tons that STEEL estimates the industry poured in the week ended Dec. 23. Output then was 1.4 per cent above the previous week's. Steelmakers trimmed their production slightly during the Christmas week to cut down on overtime pay and to repair furnaces that will be working close to capacity for the next six months.

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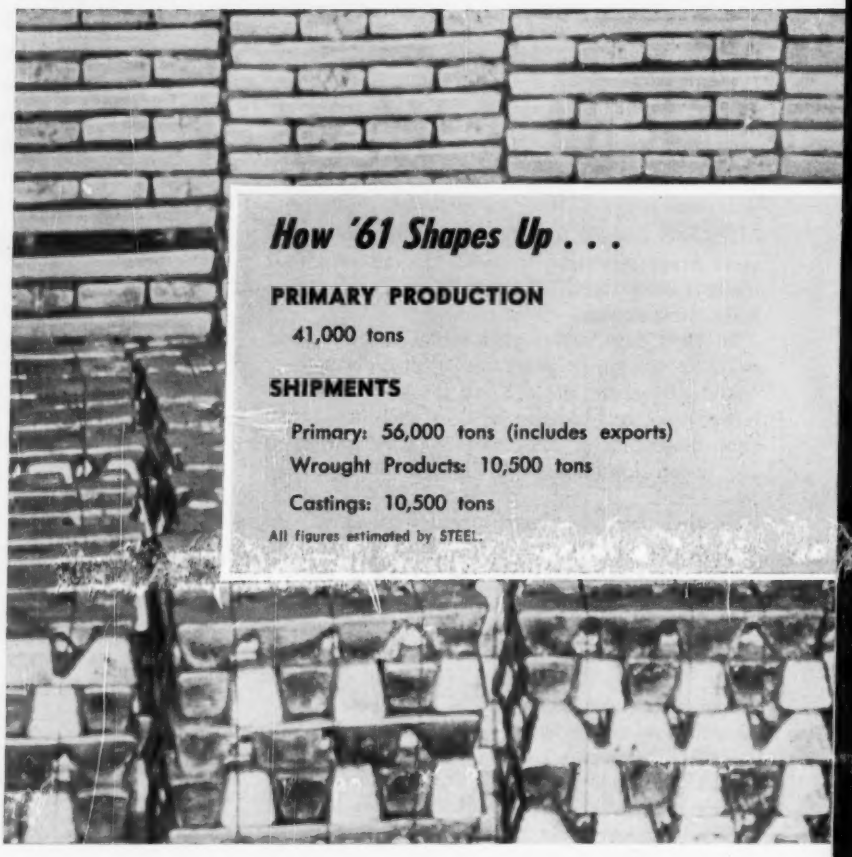
With growing commercial usage . . .

Prospects For Magnesium Brighten



How '61 Shapes Up . . .

PRIMARY PRODUCTION

41,000 tons

SHIPMENTS

Primary: 56,000 tons (includes exports)
Wrought Products: 10,500 tons
Castings: 10,500 tons

All figures estimated by STEEL.

THE MAGNESIUM INDUSTRY looks for a better year in 1962. Industry leaders hope the anticipated upswing will pull sales off the plateau it has been on the last few years.

Look for primary magnesium production in 1962 to hit around 60,000 tons, the highest mark since 1957. For the last several years, shipments have outraced production as stocks were worked off. Producer inventories are now near "normal" levels, so shipments will more closely parallel output. U. S. primary shipments in 1962 (including exports) are expected to run 60,000 tons or better. Domestic shipments should reach 45,000 tons. Shipments of castings and wrought products could go up as much as 10 per cent, believe industry people.

• **Wrapping Up 1961** — This has been a mixed year for the industry. Primary magnesium shipments should wind up around 56,000 tons, or 4 per cent better than 1960's (see exhibit). Casting shipments will probably fall to around 10,500 tons —from 11,773 tons last year. However, shipments of wrought products should show a modest gain, climbing to at least 10,500 tons. It's possible that 1961 will be the first year in which shipments of magnesium wrought products have exceeded those of castings.

• **On a Plateau**—The recent history of sales has been one long on promise and short on performance. Demand, in terms of tons shipped, has been on a plateau for several years. The decline in manned aircraft production by the military was a blow to the industry. But over the last few years the decline in military orders has been pretty much offset by a gain in commercial business.

Increasing acceptance of magnesium in industrial and consumer uses is the most encouraging recent development. Commercial uses account for an estimated 70 per cent of consumption. At the Magnesium Association's annual meeting, more than 150 nondefense uses were on display. They included components for hand power tools, sporting goods (sleds, skis, baseball bats), camera parts and cases, lawn mower housings, material handling equipment (skids, pallets), luggage, stepladders, tooling plates, jigs and fixtures.

The industry has yet to capture a large volume civilian market. Autodom is its primary target. Present uses in autos include fuel pumps, oil filter bypass valves, and transmission stator blades. The rotor and stator for the forced air ventilation systems in all '62 model Dodges and Plymouths are fabricated from magnesium. Transmission parts show the most immediate promise,

believe industry people—they look for gains in '63 models.

• **Defense Still Big** — Magnesium people are quick to point out that they still have high hopes for the military market. Missiles and space vehicles, for example, have taken up some of the slack left by the drop in manned aircraft production. Magnesium sheets, forgings, and extrusions are found in the Titan, Talos, Bomarc, Polaris, and Jupiter missiles and the Agena satellite. The storage container and the cab of the tractor used to move the Minuteman use magnesium.

The spacecraft being designed for a lunar landing, the Rangers 3, 4, and 5, will use magnesium for 86 chassis and subchassis boxes to house electronic gear for guidance control, power, scientific experiments, and computation.

Space uses may get an added boost through a series of alloys (containing 8 per cent or more of lithium) being researched at Battelle Memorial Institute, Columbus, Ohio.

The industry is looking to other defense fields. With the Army's new stress on mobility, it's reasonable to assume that magnesium will be used in lightweight vehicles and armament, say industry people. (To date, the field has not accounted for much consumption.)

Demand for aluminum will be a big factor in magnesium's growth—the metal is a key alloying additive in the production of aluminum.

• **Product Mix Changing** — Sand castings were the major magnesium product from the early World War II days to the mid-1950s when the bulk of orders was from the aircraft industry. The trend since has been toward greater use of wrought products. The one exception: Diecastings are the fastest growing segment of magnesium business.

Magnesium people aren't writing off sand castings as a market that will steadily decline. They point out that certain programs like the Nike Zeus could bring a resurgence in demand.

• **Starting to Sell** — Magnesium's dependence on the aircraft industry held back aggressive promotion and selling. Only in the last few years has the industry been competing in the market place with other metals, and as one magnesium man puts it: "We're just beginning to learn how to sell."

Research and development activities are also being stepped up—little work was done in this area when aircraft was the major customer. Another factor: The magnesium industry is basically composed of small companies—one reason that more R&D has often been done by customers than by the industry itself.

The industry is confident that it's learning more about its products and how to sell them and that substantial growth will come in the next few years. Certainly, the capacity is available for a substantial uptrend in sales. Dow Chemical Co. alone has a rated capacity of 81,000 tons annually. Alabama Metallurgical Corp. can turn out 6000 tons yearly. The third producer is Nelco Metals Div. of Charles Pfizer & Co.

It produces around 5000 tons yearly for the Atomic Energy Commission.

Steel Ingot Production—November, 1961

Period 1961	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
January	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February	5,347,458	68,138	225,963	597,539	6,239,098	83.7
March	6,068,244	75,694	281,698	660,753	7,086,389	85.9
1st Quarter ...	16,955,602	193,441	720,916	1,871,532	19,741,491	82.4
April	6,551,518	65,503	269,991	697,675	7,584,687	95.0
May	7,743,927	79,758	342,251	814,690	8,980,626	108.9
June	7,375,876	85,494	323,589	766,897	8,551,856	107.1
2nd Quarter ...	21,671,321	230,755	935,831	2,279,262	25,117,169	103.7
1st Half	38,626,923	424,196	1,656,747	4,150,794	44,858,660	93.1
July	7,131,419	78,585	254,245	627,709	8,091,958	98.1
August	7,511,016	81,554	297,406	770,551	8,660,527	105.0
September ...	7,696,138	85,509	377,175	756,435	8,915,257	111.7
3rd Quarter ...	22,338,573	245,648	928,826	2,154,695	25,667,742	104.8
9 Months	60,965,496	669,844	2,585,573	6,305,489	70,526,402	97.1
*October	7,844,886	69,948	445,512	812,824	9,173,170	111.2
†November ...	7,466,000	163,000	461,000	759,000	8,749,000	109.2

*Revised. †Preliminary. (a) Index based on average production 1957-59 as 100. (b) Includes crucible steel. Data from American Iron & Steel Institute.

Tubular Goods . . .

Tubular Goods Prices, Page 76

A Midwestern producer of buttweld pipe reports December demand is slightly better than November's. For several months prior to November, the maker had a steadily rising volume of business. Demand slowed down in November.

Rotary oil rig drilling reached a new high for 1961 in the week ended Dec. 11. The Hughes Tool Co. survey showed 2036 rigs operating in the U. S., up 72 from the preceding week. Active Canadian rigs totaled 167, a gain of 22.

Steel President Predicts Good First Half in '62

Active steel buying and steelmaking in January are expected by A. S. Glossbrenner, president, Youngstown Sheet & Tube Co., Youngstown. He looks for good business in the first half of 1962, but says "what comes after that is anyone's guess."

Mr. Glossbrenner attributes the first half outlook to a rush by buyers to build up stocks to carry them through a possible strike next summer. Some automobile companies are ordering for January delivery tonnage 15 to 20 per cent beyond their expected January consumption. Makers of home appliances are increasing their purchases. Tin plate business is good. Not much improvement in demand for pipe is seen by Mr. Glossbrenner.

He feels that the spurt in steel business generally will help spur business of other industrial firms, such as railroads.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 73 & 74

Some sheet buyers are seeking protection six months ahead on a normal consumption basis, plus certain stock buildup as a hedge against a midyear strike. Mills are accepting orders that far in advance with the provision that shipments be fairly well spread throughout the first half.

Heaviest demand is for cold rolled sheets, reflecting active specifications from the auto industry and improved orders from makers of household appliances, electrical

tubing, office furniture, and miscellaneous consumers.

Some mills have orders in hand from larger users running 60 days into the future. Small users appear less concerned about building stocks.

Steel Bars . . .

Bar Prices, Page 72

Demand for commercial steel bars is increasing. Manufacturers of fasteners and small tools are reported buying more freely. Producers of cold drawn bars are ordering hot bar stock more actively, and manufacturers of various types of industrial equipment are stepping up their orders. Producers of alloy bars also report improved demand.

The Connors Steel Div., Birmingham, H. K. Porter Company Inc., raised its price $3 a ton on cold drawn carbon bars, effective Dec. 12. It's now quoting $8.25 per 100 pound against $8.10 formerly.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 73

Builders are continuing to exert pressure on concrete reinforcing bar prices. Take New England: Although constructors' estimates for bars in place are steady at 11 to 14 cents per pound, they are able to buy deformed and fabricated bars 2 to 4 cents below those estimates. On most projects, the profit on the bar unit is substantial.

Heavy Demand for Steel Pushes Production Higher

STEEL production is being pushed steadily higher by the increasingly heavy flow of orders for finished products. Incoming orders are the heaviest since customers rushed to replenish stocks following the 1959 steel strike. The bulk of the new business is coming from the automotive industry, but demand is broadening.

Ingot production for the week ended Dec. 23 is estimated by STEEL at 2,230,000 tons, highest since the week ended Apr. 23, 1960.

- **Youngstown** — Production was scheduled to climb sharply to 67 per cent of 1960 capacity for the week ended Dec. 23, a gain of 7 points. Orders for January and February delivery are rising rapidly and are believed to be a prelude to greater boosts in steelmaking early in 1962.

- **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta section of the Southern District rose about 6 points during the week ended Dec. 23 to 80 per cent of 1960 capacity.

- **Chicago** — Scheduled at 85 per cent of 1960 capacity for the week ended Dec. 23, the steelmaking rate here rose 1 point. U. S. Steel Corp. added four open hearths at its South Works, making 17 of 31 active. A blooming mill at the plant was also reactivated.

- **Buffalo**—Steel operations declined slightly during the week ended Dec. 23 to 63.5 per cent of 1960 capacity as a result of shutting down of an open hearth at the Wickwire Spencer Steel mill.

- **Philadelphia**—Steelmaking operations in the Northeastern District eased slightly for the week ended Dec. 23. A further and more pronounced drop is expected in the week ending Dec. 30. The AISI index for the week ended Dec. 16 rose 2 points to 115.

- **Cincinnati** — Production moved higher to about 87 per cent of 1960 capacity for the week ended Dec. 23, a gain of 3 points.

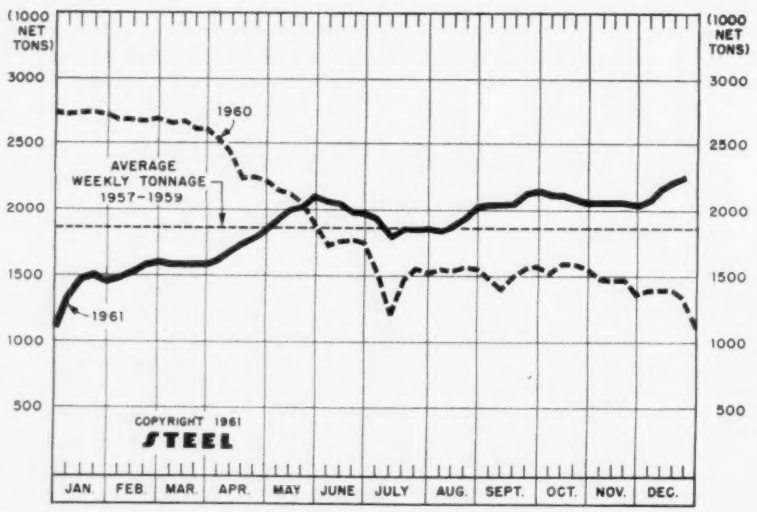
- **Los Angeles**—The Western district operating rate held steady at about 81 per cent of 1960 capacity for the week ended Dec. 23. Some mills posted fractional gains.

STEEL INGOT PRODUCTION

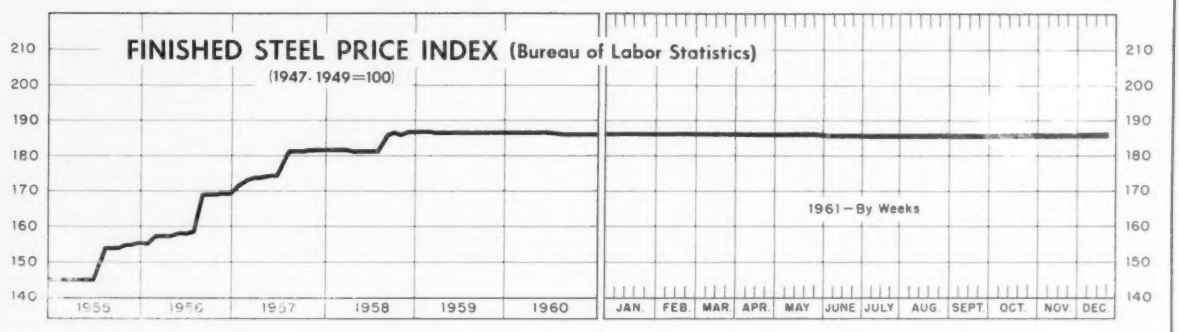
Weeks Ended	Net Tons	Change
Dec. 23	2,230,000*	+ 1.4%
Dec. 16	2,200,000	+ 1.9%
Dec. 9	2,158,000	+ 4.1%
Totals to Dec. 16		
1961	93,311,000	— 2.8%
1960	95,985,000	

DISTRICTS	Week Ended —Dec. 16— Tons‡	Index†	Week Ended Dec. 9 Index†
Northeastern	307,275	115	113
Buffalo	112,932	116	113
Pittsburgh	447,939	111	105
Youngstown	169,981	100	98
Cleveland	115,744	125	121
Detroit	160,523	153	158
Chicago	478,817	128	126
Cincinnati	97,272	129	135
St. Louis	68,315	130	122
Southern	120,320	111	105
Western	120,420	103	108
Industry	2,200,000	118.1	115.8

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Dec. 19, 1961	Week Ago	Month Ago	Nov. Index	Year Ago
185.4	185.4	185.4	185.4	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 19

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	(N.A.)
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.643
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.225
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.460
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv. Buttweld (100 ft)	23.098
		Pipe Line (100 ft)	195.423
		Casing, Oil Well, Carbon (100 ft)	193.028
		Casing, Oil Well, Alloy (100 ft)	302.645
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10 100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, 8d Common (50 lb)	4.715
		Wire, Barbed (80-rod spool)	8.416
		Woven Wire Fence (20-rod roll)	21.003

STEEL's FINISHED STEEL PRICE INDEX

	Dec. 20 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	225.92
Index in cents per lb	6.713	6.713	6.713	6.713	6.111

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.66
No. 2 Fdry, Pig Iron GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	34.33	34.33	33.00	29.00	64.83

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 20 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.98	5.35
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5 745	5.745	5.745	5.745	5.40
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.20
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.95
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Dec. 20 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.18	66.26
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Frdy, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.68	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	235.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$35.50	$35.50	$33.50	$26.50	$66.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	34.00	34.00	63.00
No. 1 Heavy Melt, Chicago	33.50	33.50	31.50	26.50	65.00
No. 1 Heavy Melt, Valley	37.50	36.50	33.50	26.50	66.50
No. 1 Heavy Melt, Cleve.	34.50	33.50	30.50	23.50	65.00
No. 1 Heavy Melt, Buffalo	27.50	27.50	28.50	23.50	62.50
Rails, Rerolling, Chicago	58.50	58.50	57.50	48.50	89.50
No. 1 Cast, Chicago	41.50	41.50	39.50	37.50	50.50
COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32 00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Dec. 20, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 73; footnotes page 75.

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 .....119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ...119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14.122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
N.Tonawanda S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2 .5.50
Lackawanna,N.Y. B3 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ...5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2...5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1...8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1..7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,Ohio R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2...7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron
Ashland c.l. (15) A10...5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES
Cleveland J5 .....6.375
Claymont,Del. P4 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
N.Tonawanda S47 .....5.675
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle(9) B3, N15 ....6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9)N15 ..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5.5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
N. Tonawanda S47 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H. R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 .....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2...5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12...5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14.....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30...11.75*

Alloy
Ambridge,Pa. W18....10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5....7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2...7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4...7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2.....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025

Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 ..... 9.20
N.Tonawanda S47 .....9.025
Plymouth,Mich. P5 ....9.225
S.Chicago, Ill. W14 ....9.025
SpringCity,Pa. K3 .... 9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 ..... 5.00
Birmingham C15 ..... 5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
Seattle B3, N14 .....6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Williamsport,Pa. S19 ...5.75

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2....7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
Seattle B3, N14 .....7.95
Williamsport,Pa. S19 ..7.00
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks.(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled)L513.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa.S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10.... 5.35
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 ..... 7.05
Middletown,O. A10 ....6.775
Warren,O. R2 ..... 7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana, Calif. K1 .... 7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10..7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10(type 1) 9.525
Butler,Pa. A10(type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped‖

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. ‖For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Branford Machine & Mfg.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman & Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P10 Precision Strip Mill Div., Solar Steel Corp.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries
T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L7 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit, M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle-N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5, Y1 ....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 .....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 .8.325
SparrowsPoint,Md. B2 .7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ... 5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10 7.875
NewBritain,Conn. S15..7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
RiverRouge,Mich. P16..7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ...5.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ....7.975
Youngstown S41, Y1 ...7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ...10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4 M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N2	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
RiverRouge,Mich. P10	9.05	10.50	12.70	....	....
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.55
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....4.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.425*
Warren,O. B9, S3, T5..7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 .....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
GraniteCity,Ill. G4	....	....	....	6.65
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irwin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt)	0.25 lb Coating
Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

ELECTRO. TIN-COATED SHEET (20-27 gage; per 100 lb)

IndianaHarb.,Ind. Y1	$7.90

(21-27 gage; per 100 lb)

Aliquippa,Pa. J5	$7.90
Niles,O. R2	7.90

TIN PLATE, HOT DIPPED COMMON COKE

	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ⅓c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*11.30*		12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*11.20*		11.90*	13.05*	....
Mansfield,O. E6	9.875	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875	11.70	12.40	13.55	14.65
Warren,O. R2	9.875	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ⅓c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ⅓c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ..8.00
N.Tonawanda S47 .....8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00
Buffalo S47 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2..12.65
KansasCity,Mo. U3 ....12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16 .12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 .....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.075
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.20
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.20
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 .....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 .....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ....13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	175
Pittsburg,Calif. C11	192
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N16	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill. (7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa.	J5..17.85	19.65
Bartonville	K4 ..17.95	19.80
Chicago	W13 ...17.85	....
Cleveland	A7 ....17.85	....
Craw'sville	M8 17.95	19.80†‡
Fostoria,O.	S1 ..18.35	19.90†
Houston	S5 ....18.10	19.65**
Jacksonville	M8 17.95	19.80†‡
Johnstown	B2 ..17.85	19.65§
Kan.City,Mo.	S5..18.10	....
Kokomo	C16 ...17.95	19.50†
Minnequa	C10..18.10	19.65**
P'lm'r,Mass.	W12 19.10	19.70†
Pitts.Calif.	C11.18.20	19.75†
S.SanFran.	C10 18.20	19.75**
SparrowsPt.	B2.17.95	19.75§
St'ling(37)	N15 ..17.95	19.80
Waukegan	A7 ..17.85	19.40†
Worcester	A7 ...18.15	....

FENCE POSTS

	Col.
Birmingham	C15 177
ChicagoHts.,Ill.	C2, I-2..177
Duluth	A7 177
Franklin,Pa.	F5 177
Johnstown,Pa.	B2 177
Marion,O.	P11 177
Minnequa,Colo.	C10 182
Tonawanda,N.Y.	B12 ...177

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga.	J5 190§
Atlanta	A11 ....191*
Bartonville,Ill.	K4 192
Crawfordsville,Ind.	M8..192
Donora,Pa.	A7 ....187†
Duluth	A7 ....187†
Fairfield,Ala.	T2 ....187†
Houston	S5 ....192**
Jacksonville,Fla.	M8 192
Johnstown,Pa.(42)	B2 .190§
Joliet,Ill.	A7 ....187†
KansasCity,Mo.	S5 ....192**
Kokomo,Ind.	C16 ....189†
Minnequa,Colo.	C10 ..192**
Pittsburg,Calif.	C11 ...210†
S.Chicago,Ill.	R2 ....187**
Sterling,Ill.	(7) N15 192

WIRE, Merchant Quality

	6 to 8 gage	An'ld	Galv.
Ala.City,Ala.	R2	9.00	9.55**
Aliquippa	J5	....8.65	9.325§
Atlanta(48)	A11	..9.00	9.75*
Bartonville(48)	K4.	9.10	9.80
Buffalo	W12	....9.00	9.55†
Chicago	W13	....9.00	9.55**
Cleveland	A7	....9.00	....
CrawfordsvilleM8		9.10	9.80††
Donora,Pa.	A7	..9.00	9.55†
Duluth	A7	....9.00	9.55†
Fairfield	T2	....9.00	9.55
Houston(48)	S5	..9.25	9.80**
Jack'vill.,Fla.	M8	9.10	9.80‡‡
Johnstown(48)	B2	9.00	9.675§
Joliet,Ill.	A7	....9.00	9.55†
KansasCity(48)	S5	9.25	9.80**
Kokomo(48)	S16	..9.10	9.65†
LosAngeles	B3	..9.95	10.625§
Minnequa	C10	..9.25	9.80**
Monessen(48)	P7	8.65	9.35§
Palmer,Mass.	W12	9.30	9.85†
Pitts.,Calif.	C11	..9.95	10.50†
S.SanFran.	C10	9.95	10.50**
S.Chicago	R2	...9.00	9.55**
Spar'wsPt.(48)	B2	9.10	9.775§
St'ling(37)(48)	N15	9.10	9.80
Struthers,O.	Y1	..9.00	9.65‡
Worcester,Mass.	A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.: Base, one keg .... 43.00 20,000 lb or more .. 53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and setscrews apply only to products ordered in these minimum quantities: ¼ in. through ⅝ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in. larger 12.85 7/16 in. and smaller by 6 in. and shorter, 11% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2⅝	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.725
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) 5/16" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Shaered; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1⅛		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; Branford Machine & Mfg. Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates, Carbon Base 5%	10%	15%	20%	Sheets, Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.35	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4, stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	½	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Minimum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
NorthTonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	78.11	78.61	79.11	....
Rochester, N.Y., deld.	69.87	70.37	70.87	....
Syracuse, N.Y., deld.	71.22	71.72	72.22	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
SouthChicago, Ill. R2	66.00	66.50	66.50	67.00
SouthChicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland A7, R2	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.60%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.45% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa, Open-hearth & Fdry. K2	89.00
Keokuk, Iowa, O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

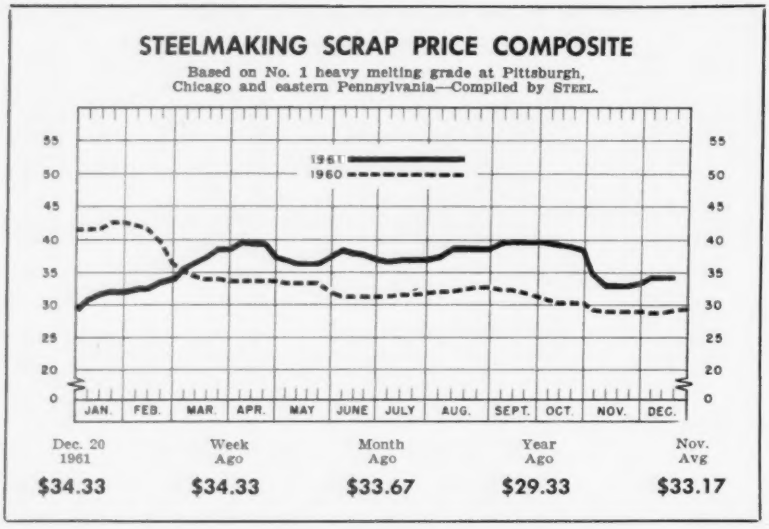
Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.25	10.26	10.06	8.85	9.05	11.70	16.38	8.85	8.70	10.55
Birmingham	9.11	11.00	11.39	10.10	8.91	13.14	16.65	9.12	9.06	10.70
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.60	10.10
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.20	9.70
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	12.15	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
Philadelphia	9.50	10.00	10.66	11.45	9.85	11.95	16.38	10.00	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.05	17.70	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅜ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.



Scrap Marking Time Over Yearend

Market undertone stronger despite absence of active buying on domestic and export accounts. Dealers are anticipating substantial rise in orders next month

Scrap Prices, Page 78

• **Chicago**—Although the mills continue to restrict purchases and are displaying little interest in future needs, the tone of the market appears stronger. A few steelmaking grades have inched up $1 a ton.

• **Philadelphia** — Prices appear stronger, reflecting in part light stocks at dealer yards and prospects for heavier consumption after the holidays. Prices on couplers, springs, and wheels have been advanced to $43 delivered.

• **New York**—Brokers buying prices are steady, but with an undertone of strength which may result in a higher market after the turn of the year. This applies not only to the major tonnage grades but to the stainless specialties as well.

• **Boston** — Scrap consumers are not building stocks for the winter months although their inventories are low. The gray iron foundry melting rate is not in excess of 60 per cent of capacity. Most large tonnage transactions in scrap are for export.

• **Cleveland**—Not much activity is expected until after the holidays. Most traders are bullish about the first quarter, anticipating rising demand and rising prices in step with advancing steelmaking operations. The market is firmly established on the basis of $33-$34 for No. 1 heavy melting at Cleveland and $36-$37 at Youngstown. Bidding on month-end auto lists will point the way for the rest of the list in January.

• **Pittsburgh**—With district steelmaking operations at the highest level in 19 months, dealers are looking for an upturn in scrap demand. They're confident that major consumers will resume buying after the turn of the year. Low phos scrap is stronger, but prices on the other grades are unchanged. Brokers' bids on No. 1 factory bundles for January shipment are expected to be higher than the December bids.

• **Buffalo**—While dealers are optimistic over demand in the immediate future, no new orders of consequence are expected until after the turn of the year. Most traders anticipate a price boost of $1-$2.

• **Cincinnati**—Prices edged up $1 a ton on the principal steelmaking grades, with traders anticipating improved January business. No. 1 heavy melting is quoted $33.50-$34.50.

• **St. Louis**—Little scrap is moving; brokers and traders are holding material until January when they expect demand to pick up. Prices on a few items moved up $1 a ton last week, including No. 1 cupola cast, clean auto cast, and railroad specialties. Rails (18 in. and under) dropped $1 to $42.

• **Birmingham** — Prices are unchanged in this market. Some large tonnages of electric furnace material are reported to have been purchased at published prices.

• **Houston**—The local mill is expected to purchase limited tonnages before monthend for delivery in January. The mill holds a substantial inventory of scrap but will place small tonnage to help suppliers maintain their market positions. The Lone Star mill in East Texas is not expected to purchase any scrap until next month.

• **Seattle**—Buying is at a virtual standstill. Domestic demand is negligible, and Japanese buyers are showing little interest. Published quotations are nominal in the absence of a thorough buying test.

• **San Francisco**—Prices appear to be on bottom, at least for the present. Dealers say there are no signs of a further markdown despite the absence of active demand.

Scrap Consumption Gains In October; So Do Stocks

Domestic consumption of ferrous scrap in October totaled 5,219,000 gross tons, up 5 per cent from September's 4,985,631 tons, reports the U. S. Bureau of Mines. The month's total was also 19 per cent above consumption in October, 1960.

Pig iron consumption during the month was 5,647,000 tons vs. 5,450,-953 in the preceding month. The total was the highest for any month since April, 1960.

The total furnace charge of scrap and pig iron in October was 10,-866,000 gross tons, 4 per cent higher than in the previous month, and consisted of 48 per cent scrap and

(*Please turn to Page* 83)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 20, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 20	$34.33
Dec. 13	34.33
Nov. Avg.	33.17
Dec. 1960	28.92
Dec. 1956	64.29

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	25.00-26.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling	35.00-36.00
No. 1 factory bundles	41.00-42.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Shovel turnings	18.00-19.00
Cast iron borings	17.00-18.00
Cut structurals:	
2 ft and under	*41.00-42.00*
3 ft and under	*38.00-39.00*
Heavy turnings	31.00-32.00
Punchings & plate scrap	*43.00-44.00*
Electric furnace bundles	42.00-43.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	30.00-31.00
Stove plate	30.00-31.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	32.00-33.00
Drop broken machinery	44.00-45.00§

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00
Rails, 2 ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Random rails	45.00-46.00
Angles, splice bars	43.00-44.00
Railroad specialties	46.00-47.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	55.00-60.00

CHICAGO

No. 1 hvy melt., indus.	34.00-35.00
No. 1 hvy melt., dealer	32.00-33.00
No. 2 hvy melting	*30.00-31.00*
No. 1 factory bundles	37.00-38.00
No. 1 dealer bundles	*34.00-35.00*
No. 2 bundles	24.00-25.00
No. 1 busheling, indus.	34.00-35.00
No. 1 busheling, dealer	32.00-33.00
Machine shop turnings	18.00-19.00
Mixed borings, turnings	20.00-21.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Cut structurals, 3 ft	43.00-44.00
Punchings & plate scrap	45.00-46.00

Cast Iron Grades

No. 1 cupola	41.00-42.00
Stove plate	35.00-36.00
Unstripped motor blocks	33.00-34.00
Clean auto cast	46.00-47.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
R.R. malleable	48.00-50.00
Rails, 2 ft and under	51.00-52.00
Rails, 18 in. and under	53.00-54.00
Angles, splice bars	44.00-45.00
Axles	53.00-54.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles, solids	*185.00-190.00*
18-8 turnings	*105.00-110.00*
430 bundles & solids	*85.00-90.00*
430 turnings	*50.00-55.00*

BUFFALO

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	27.00-28.00
No. 2 bundles	22.00-23.00
No. 1 busheling	27.00-28.00
Shovel turnings	17.00-18.00
Machine shop turnings	12.00-13.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	36.00-37.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cuopla	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	38.00-39.00
Rails, 3 ft and under	44.00-45.00
Railroad specialties	37.00-38.00
Rails, rerolling	60.00-61.00

CLEVELAND

No. 1 heavy melting	*34.00-35.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 factory bundles	37.00-38.00
No. 1 bundles	*35.00-36.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling	*35.00-36.00*
Machine shop turnings	*16.00-17.00*
Shovel turnings	*20.00-21.00*
Mixed borings, turnings	*20.00-21.00*
Cast iron borings	*20.00-21.00*
Cut foundry steel	*35.50-36.50*
Cut structurals, plate 2 ft and under	*40.00-41.00*
Low phos. punchings & plate	*36.00-37.00*
Alloy free, short shovel turnings	*21.00-22.00*
Electric furnace bundles	*36.00-37.00*

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Charging box cast	*27.00-28.00*
Heavy breakable cast	*27.00-28.00*
Stove plate	*35.00-36.00*
Unstripped motor blocks	*28.00-29.00*
Brake shoes	*38.00-39.00*
Clean auto cast	*40.00-41.00*
Burnt cast	*31.00-32.00*
Drop broken machinery	*46.00-47.00*

Railroad Scrap

R.R. mallable	48.00-49.00
Rails, 2 ft and under	48.00-49.00
Rails, random lengths	45.00-46.00
Rails, 18 in. and under	50.00-51.00
Cast steel	40.00-41.00
No. 1 railroad cast	45.00-46.00
Railroad specialties	46.00-47.00
Angles, splice bars	43.00-44.00
Rails, rerolling	50.00-51.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	85.00-90.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*27.00-28.00*
No. 1 busheling	*38.00-39.00*
No. 1 bundles	*38.00-39.00*
No. 2 bundles	*25.00-26.00*
Machine shop turnings	*16.00-17.00*
Shovel turnings	*21.00-22.00*
Cast iron borings	*21.00-22.00*
Low phos.	*39.00-40.00*
Electric furnace bundles	*39.00-40.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-40.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*33.50-34.50*
No. 2 heavy melting	*26.00-27.00*
No. 1 bundles	*34.50-35.50*
No. 2 bundles	18.00-19.00
No. 1 busheling	*33.50-34.50*
Machine shop turnings	8.00-9.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	33.00-34.00
Heavy breakable cast	29.00-30.00
Charging box cast	32.00-33.00
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	*48.00-49.00*
Rails, random lengths	*42.00-43.00*

DETROIT (Brokers' buying prices)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	30.00-31.00
No. 2 bundles	21.00-22.00
No. 1 busheling	27.00-28.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	11.00-12.00

Cast Iron Grades

No. 1 cupola	30.00-31.00
Mixed cast	29.00-30.00
Heavy breakable	25.00-26.00
Unstripped motor blocks	21.00-22.00
Clean auto cast	37.00-38.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	70.00-75.00
430 bundles & solids	65.00-70.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	36.00
No. 2 bundles	23.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	15.00†
Shovel turnings	20.00
Machine shop turnings	13.00†
Heavy turnings	24.00†
Structurals & plates	38.00-40.00
Couplers, spring, wheels	*43.00*
Rail crops, 2 ft & under	48.00-49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	39.00
Drop broken machinery	48.00
Malleable	48.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	27.00-28.00
No. 2 bundles	18.00-19.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	31.00-32.00

Stainless Steel

18-8 sheets, clips, solids	145.00-150.00
18-8 borings, turnings	70.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	27.00
No. 1 bundles	32.00
No. 2 bundles	22.00
No. 1 busheling	32.00
Machine shop turnings	15.50
Shovel turnings	17.50

Cast Iron Grades

No. 1 cupola	*35.00*
Charging box cast	33.00
Heavy breakable cast	31.00
Unstripped motor blocks	33.00
Clean auto cast	*38.00*
Stove plate	31.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00
Rails, random lengths	39.00
Rails, rerolling	52.00
Rails, 18 in. and under	*42.00*
Railroad specialties	*39.00*
Angles, splice bars	38.00

BIRMINGHAM

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
No. 1 busheling	36.00-37.00
Cast iron borings	10.00-11.00
Machine shop turnings	16.00-17.00
Shovel turnings	19.00-20.00
Bar crops and plate	42.00-43.00
Structurals & plate	41.00-42.00
Electric furnace bundles	36.00-37.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	40.00-41.00
Stove plate	40.00-41.00
Unstripped motor blocks	29.00-30.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, rerolling	46.00-47.00
Rails, 2 ft and under	45.00-46.00
Rails, random lengths	41.00-42.00
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	36.00-37.00
No. 2 bundles	*22.00-23.00*
Machine shop turnings	12.50-13.00
Crushed turnings	18.00-19.00
Low phos. plate & structurals:	
3 ft	*38.00-39.00*
2 ft and under	43.00-44.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable	24.00-25.00
Foundry malleable	28.00-29.00
Unstripped motor blocks	29.00-30.00

Railroad Scrap

R.R. heavy melt (3 ft)	36.00-37.00

LOS ANGELES

No. 1 heavy melting	*35.00*
No. 1 hvy melt (export)	*38.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	*25.00†*
No. 2 bundles	*22.00*
Machine shop turnings	10.00
Shovel turnings	10.00
Cast iron borings	10.00
Electric furnace scrap.	44.00

Cast Iron Grades

No. 1 cupola	45.00

Railroad Scrap

No. 1 R.R. heavy melt.	38.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	38.00
No. 2 heavy melting	35.00
No. 2 bundles	25.00
Shovel turnings	16.00
Electric furnace	50.00-54.00

Cast Iron Grades

No. 1 cupola	36.00
Heavy breakable	33.00
Unstripped motor blocks	31.00
Stove plate (f.o.b. plant)	31.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	38.00
No. 1 hvy (unprepared)	33.00
No. 2 heavy melting	35.00
No. 2 hvy (unprepared)	31.00
No. 2 bundles	25.00
Shovel turnings	16.00
Electric furnace	51.00-55.00

Cast Iron Grades

No. 1 cupola	36.00
Heavy breakable cast	33.00
Stove plate	31.00
Unstripped motor blocks	31.00

SAN FRANCISCO

No. 1 heavy melting	35.00**
No. 2 heavy melting	30.00**
No. 1 bundles	25.00**
No. 2 bundles	22.00**
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

No. 1 heavy melting	27.00
No. 2 hvy melt, 2 ft & under	26.00
No. 1 bundles	28.00
No. 2 bundles	21.50
Mixed steel scrap	19.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	27.00
Unprepared	21.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Aluminum Market to Gain in '62

Sales are expected to rise at least 10 per cent as business picks up across the board. Prices look stable. Most labor contracts expire on July 31

Nonferrous Metal Prices, Pages 82 & 83

THE ALUMINUM OUTLOOK for 1962 is clouded by the uncertainties that are always present in a year of major labor negotiations. On July 31, contracts expire for most of the primary producers.

If history repeats itself, there will be no strike. Aluminum labor settlements traditionally closely parallel those in steel. The unions (chief among them is the United Steelworkers of America) generally sit back and wait for the steel negotiations to end before talking turkey with aluminum producers. The exception: In 1959, major aluminum contracts expired on July 31, but work continued uninterrupted (with only token negotiation sessions) until December, when a new contract was signed shortly before the steel settlement.

● **Point of Departure**—Some sources hint this may be the year aluminum "will go it alone" and hammer out a contract based solely on the economic position of the industry. Certainly the industry has a talking point in its dealings with the union: The present ingot price of 24 cents is 2 cents a pound under the quotation prevailing when the last contract was penned in late 1959. During the period of the contract, the total hourly package will have increased by 39 cents.

It's unlikely that prices will be much, if any, higher by next August. Top aluminum people would like to see the ingot price go back to the 26 cent a pound level, which they term "fair and reasonable," but they admit that the current 24 cents is "more realistic" under present market conditions. Discount selling of mill products is still prevalent though perhaps a shade less than earlier this year. Discounting in pig also continues, mainly in such forms as scrap and freight allowances. No significant strengthening of prices is in sight.

Whether the price situation and the generally low level of profits per dollar of sales will make the industry tough at the bargaining table remains to be seen.

ALUMINUM

Highlights of '61

(Net tons)

Shipments	2,400,000
Primary Production	1,890,000
Secondary Production	305,000
Imports (crude aluminum)	210,000
Exports (crude aluminum)	130,000

All data estimated by STEEL.

The remainder of the '62 outlook for aluminum shapes up like this:

● **Sales to Rise**—Look for shipments to jump at least 10 per cent over the '61 total of around 2.4 million tons to a new high. Sparking the rise:

1. More autos will be built using more pounds of aluminum per car than ever. Forecast: 220,000 tons of aluminum will go to the auto industry in 1962.

2. Shipments to the building industry will be higher. Sales of aluminum residential siding alone are forecast at 75,000 tons (up 750 per cent from 1950).

3. Packaging, aluminum's fastest growing market, will continue to spurt. A major brewery may soon switch to aluminum cans.

4. Uses in railroad rolling stock, oil country pipe, and military ordnance are all expected to gain in 1961.

5. A bigger export market is also predicted by the industry. Exports of crude metal in 1960 hit an all-time high of 285,000 tons; they fell this year to an estimated 130,000 tons. Foreign customers probably overbought in 1960 and may be in the market for more metal in 1962 as stocks are pared. Scrap exports should remain high.

● **Imports Up** — Imports of both crude metal and fabricated products will probably increase. Better demand in this country will prove a lure to foreign aluminum, particularly from those nations where domestic demand may be down a bit.

● **More Production**—Look for U. S. primary production to rise modestly, but not by a percentage as big as that for sales. Producers' stocks are still hefty; they will be pared down before much more production is reactivated. Probable: Primary production in 1962 of 1,925,000 to 1,950,000 tons.

● **Smelters Bullish**—Last Monday, Dec. 18, Apex Smelting Co., a leading producer of custom smelted aluminum, took the industry by surprise by cutting most prices 0.5 cent a pound. Competitive market conditions was the reason given. Most other smelters followed, although not all made public announcement of the fact. The immediate reaction was a considerable flurry of order placing at the lower prices. Regardless of this price weakness, the industry is confident about 1962. A healthy gain is expected, with smelter output estimated at 385,000 to 390,000 tons.

Summing up: 1962 will see a healthy rise in aluminum sales; the pressure on profits will continue; a strike can probably be averted; prices probably won't change much.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellsville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup, Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:

Carbon (N.T.):
- Forging $97.00
- Rerolling 78.00
- Alloy (N.T.) 115.00

Wire Rods:
- Carbon 5.70
- Alloy 6.40

Wire (carload lots):
- Merchant annealed.. 8.40
- Low carbon indus... 7.20
- Upholstery spring .. 8.55
- M.B. spring 8.85

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85§
40 mesh bags	7.40††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, 1 in. x 1 in. x $\frac{1}{8}$ in.	27.75

(In contract lots of 750 tons price is 22.75c)

Annealed, 99.5% Fe...36.75 ton deld. east of Mississippi.

Unannealed (99+% Fe) 33.0

Unannealed (99+% Fe) (minus 325 mesh) ... 58.0

Carbonyl Iron:
- 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh

Aluminum:
- Atomized, 600-lb drum freight allowed, c.l. 41.30; ton lots 40.30

Brass, 80/20, leaded (60 mesh) 37.80

Bronze powder, 90-10. 56.80

Copper, all types 15.00*

Lead 7.50*

Manganese, 500 lb and up 25.00*

Nickel, all types ...0.78-1.06

Nickel-Silver 56.00

Solder 7.00*

Stainless Steel, 304 ... 89.00

Stainless Steel, 316 ...$1.07

Steel, AISI 4600 ..... 32.00

Tin 14.00*

Zinc 23.20

Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5% below 5 microns	2.32
Molybdenum	3.50-4.10

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. (Source of shipment: Western Continental Europe.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.05	$5.10	$5.00	$4.90	$5.20
Bar Size Angles	5.15	....	5.10	5.00	5.30
Structural Angles	5.15	5.20	5.10	5.00	5.30
I-Beams	5.15	5.20	5.10	5.00	5.30
Channels	5.20	5.25	5.15	5.05	5.35
Plates (basic bessemer)	5.20	5.25	5.10	5.10	5.45
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	24.16	....	24.09	23.81	25.54
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	5.20	5.25	5.15	5.05	5.35
Hot-Rolled Bands	5.65	5.70	5.60	5.50	5.80
Wire Rods, Thomas No. 5 (Niederrhein)	5.40*	5.50	5.35	5.35	5.60
Wire Rods, O.H., No. 5 (Niederrhein)	5.70*	5.80	5.65	5.65	5.90
Bright Common Wire Nails (§)	7.05	7.10	7.00	6.90	7.20
(Source of Shipment: Japan)					
Wire, galvanized	8.60	....	8.60	8.60	8.55
Wire, bright	7.60	....	7.60	7.60	7.55
Wire Rods, O.H. No. 5 (Sumitomo)	5.60	....	5.60	5.50	....
Strand, stress relieved (Sumitomo)					
⅜ in. diam, 100 lineal ft	39.90	41.00	39.90	39.90	39.50
$\frac{7}{16}$ in. diam, 1000 lineal ft	53.50	54.70	53.50	53.50	53.00
Bright common wire nails	7.00	7.30	7.00	7.00	7.00

†Per 82 lb net reel. §Per 100 lb keg, 20d and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic Ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports....	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$14.75-15.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 82.00-85.00c nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

60% min	$4.15-4.40
65% min	4.50-4.75

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens..	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.
Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.
Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.
Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.
Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.
Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.
Bismuth: $2.25 per lb, ton lots.
Cadmium: Sticks and bars, $1.70 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.
Columbium: Powder, $40 per lb and up nom.
Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.
Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.
Gold: U. S. Treasury, $35 per oz.
Indium: 99.9%, $2.25 per troy oz.
Iridium: $70-75 per troy oz nom.
Lead: Common, 10.05; chemical, 10.15; corroding, 10.15; St. Louis, New York basis, add 0.20.
Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.
Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.
Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.
Mercury: Open market, spot, New York, $188-191 per 76 lb flask.
Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.
Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09.
Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 77.50.
Osmium: $70-90 per troy oz nom.
Palladium: $24-26 per troy oz.
Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.
Rhodium: $137-140 per troy oz.
Ruthenium: $55-60 per troy oz.
Selenium: $5.75 per lb, commercial grade.
Silver: Open market, 104.75 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $5.25 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot and prompt, 120.50.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.
Zinc: Prime Western, 12.00; brass special 12.20; intermediate, 12.20, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Diecasting alloy ingot No. 3, 14.25; No. 2, 14.75; No. 5, 14.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.00; No. 12 foundry alloy (No. 2 grade), 20.75; 5% silicon alloy, 0.60 Cu max, 22.50; 13 alloy, 0.60 Cu max, 22.50; 195 alloy, 23.75; 108 alloy, 21.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.25; grade 2, 21.00; grade 3, 20.00; grade 4, 19.00.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.98, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.98, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $15.75 per cwt; pipe, full coils, $15.75 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R. .	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.60
0.751-0.250	6-144	72-240	44.50-49.60

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	55.70	....	58.30
1.750	53.00	55.70	58.30	58.30
1.875	53.00	55.70	....	58.30
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2.500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes, 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in. 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.00-19.50; No. 1 composition red brass, 21.00-21.50; No. 1

BRASS MILL PRICES

(Copper or Copper Alloy No.)	MILL PRODUCTS a Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	SCRAP ALLOWANCES d (Based on copper at 31.00c) Clean Heavy	Rod Ends	Clean Turnings
Copper (110)	56.13b	50.36–51.36	....	57.32	27.00	27.00	26.25
Yellow Brass (268, 270).	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80% (240)..	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85% (230)...	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze (675)	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal (365)	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass (464)	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Brass (651)	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10% (745)	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb. f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 20.00-20.50; new brass clippings, 15.00-15.50; light brass, 12.00-12.50; heavy yellow brass, 13.00-13.50; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 16.50-17.00; cocks and faucets, 17.00-17.50; brass pipe, 15.00-15.50.

Lead: Soft scrap lead, 6.25-6.50; battery plates, 2.00-2.25; linotype and stereotype, 7.50-7.75; electrotype, 7.00-7.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 22.00; old sheets, 28.00; turnings, 20.00-22.00; rods, 30.00.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 60.00-62.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.25; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.00-8.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 10.00-10.50; segregated high copper clips, 9.00-9.50; mixed low copper clips, 9.50-10.00; mixed high copper clips, 9.00-9.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.50; mixed low copper clips, 12.00-13.00; mixed high copper clips, 11.00-12.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.00; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.00; mixed low copper clips, 12.50; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.75; light copper, 22.50; refinery brass (60% copper) dry copper content, 24.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.75; light copper, 22.50; No. 1 composition borings, 23.50; No. 1 composition solids, 24.00; heavy yellow brass solids, 16.50; yellow brass turnings, 15.50; radiators, 20.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 140.50; 200-499 lb, 139.00; 500-999 lb, 138.50; 1000 lb or more, 138.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.85, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chrome Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.5; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 500-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 89.20; 100-600 lb, 79.50; 700-1900 lb, 76.80; 2000-9990 lb, 74.90; 10,000 lb or more, 73.60.

Stannous Chloride (Anhydrous): 100 lb, 148.40; 400 lb, 138.40; 800-19,000 lb, 117.10; 20,000 lb or more, 112.90.

Stannous Sulphate: Less than 50 lb, 155.70; 50 lb, 125.70; 100-1900 lb, 123.70; 2000 lb or more, 121.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 78*)

52 per cent pig iron, unchanged from September.

Stocks of ferrous scrap at the end of October were 8,003,000 tons, up 3 per cent from the 7,744,745 tons held at the end of September. Pig iron stocks totaled 2,710,000 tons compared with 2,677,852 at the end of the preceding month.

Iron Ore . . .

Iron Ore Prices, Page 81

Although a few vessels are still moving on the Great Lakes, for all practical purposes the 1961 navigation season has ended. Shipments of iron ore from the upper lake ports for the season totaled 57,300,197 gross tons, off substantially from the 69,631,789 tons moved in the 1960 season, but up sharply from the 43,541,344 tons moved in strike-plagued 1959.

Wilson Marine Transit Co., Cleveland, will acquire a substantial interest in Pittsburgh Pacific Co., Hibbing, Minn. The latter firm, formed in 1953, is an independent producer of iron ores in the Lake Superior District.

Pig Iron . . .

Pig Iron Prices, Page 77

Sellers of merchant iron foresee a pickup in buying as soon as yearend factors (holidays and tax considerations) are out of the way. Prospects for business in the casting industry are promising.

U. S. Steel Corp. has relighted two blast furnaces at its South Chicago (Ill.) works, bringing the number of active stacks there to seven. The two stacks just relighted had been idle since early 1960.

Fansteel Lowers Prices On Its Molybdenum Foil

Molybdenum foil has been made available in a wider range of sizes and at prices as much as 33 per cent lower by the Chemical & Metallurgical Div., North Chicago, Ill., Fansteel Metallurgical Corp. New Sendzimir mill facilities enable Fansteel to produce the foil down to 0.0001 in. thick by 6¼ in. wide.

Price reductions are credited to more efficient production. The lower prices apply to warehouse stocks

CLASSIFIED

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Business Opportunities

OPPORTUNITY AVAILABLE

Kansas-Missouri area steel fabricating company is launching a program of product diversification; desires connections with individuals or companies with new or existing steel products or plans in such diversified fields as:

Truck Bodies—Trailers
Cranes—Conveyors—Material Handling
Steel Building—Industrial Doors
R. R. Cars—Racks—Loaders
Farm Implements—Feeders
Hoppers—Bins
Continuous Cleaners—Dryers
Steel Swimming Pools
Drilling and Mining Structural Steel

Further information will be submitted upon request.

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Penton Bldg. Cleveland 13, Ohio

Help Wanted

FACTORY MANAGER

Manager experienced in sheet metal, press brake, spot welding, painting and assembly operations. Some purchasing experience helpful and tooling knowledge mandatory.

Small-medium sized manufacturer of appliances and sheet metal contract work. Position normally carries vice president title with full authority. Age no factor—need well-seasoned experienced manufacturing and/or production man. This ad inserted by president of company.

Write Box 979, STEEL
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CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $20.00, each additional word, .40; all capitals, 50 words or less $23.00, each additional word .50; all capitals leaded, 50 words or less $28.00, each additional word .65. "Position Wanted" set solid, 25 words or less $5.50, each additional word .22; all capitals 25 words or less $7.50, each additional word .29; all capitals leaded 25 words or less $9.00, each additional word .35. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Cariot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $190, Sheridan, Pa.; $200, Johnstown, Duquesne, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

(Mn 74-76%) 9.5c per lb of alloy, Rockwood, Tenn.; Houston, Tex. Add 0.1 cent per 1 per cent contained manganese over 76%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3% for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max), Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%), Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

(Mn 65-68%) Carload, lump, bulk 1.50% C grade, 10.6c per lb of alloy; 2% C grade, 10.3c; 3% grade, 10.1c, Rockwood, Tenn.; Houston, Tex.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 24.00c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5.25% max, Si 3% max, S 0.03% max, 22.00c per lb of contained Cr, cariots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, S 0.03% max, 23.00c per lb of contained Cr, delivered in cariots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03% max, 24.00c per lb of contained Cr, cariots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 68-71%: C 0.025% max, 33.00c; C 0.010% max, 33.50c per lb of contained Cr, cariots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.50c. Cr 67-73% C 0.05% max, 33.00c; C 0.75% max, 33.00c; C 2.0% max, 32.5c, cariots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 36.50c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 11.50c per lb material; Cr 44-47%, Si 37-39%, C 0.15% max, 12.60c per lb material.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, cariot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.5c per lb contained Si. Packed, c.l. 17.0c, ton lot 18.45c, less ton 20.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered, Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.
Weighing approx. 3 lb and containing 2 lb of Mn) C.l., bulk, 12.30c per lb of briquet, Rockwood, Tenn.; Houston, Tex.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c Delivered. Spot, add 0.25c
(Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb of Si) C.l., bulk, 13.10c per lb of briquet, Rockwood, Tenn.; Houston, Tex.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.

and custom ordered mill quantities. A typical reduction for warehouse foil, 0.001-in. thick, is from $175 to $117 per pound in quantities of more than 5 kilograms. Unslit mill quantities, 0.001-in. thick, have been reduced from $166 to $111 per pound.

Ferromanganese Price Is Cut by Tennessee Maker

Reductions of about 13 per cent in the base price of standard ferromanganese and 9 per cent on standard grades of silicomanganese have been announced by Tennessee Products & Chemical Corp., Nashville, Tenn., subsidiary of Merritt-Chapman & Scott Corp. The reductions are attibuted to competition from imported manganese alloys.

Other producers of ferromanganese are expected to follow the Tennessee company's move, but up to presstime only one, E. J. Lavino & Co., Philadelphia, had taken formal action. It reduced its standard ferromanganese price $30 a net ton—from $220 to $190. The company last changed its price Jan. 19, 1960—a drop of $25 a ton, reflecting a reduction in ore.

Foreign producers, says Howard B. Myers, vice president, Tennessee Products, have the advantage of lower wage costs and lower overhead. Even at the lower levels, he says, the company's new prices are not strictly competitive with those on imports. He thinks companies that have been buying part of their manganese needs abroad now may find it possible to purchase U. S. made manganese alloys entirely without increasing their over-all costs.

The new base price for 74 to 76 per cent standard high carbon ferromanganese is 9.5 cents per pound of alloy with pro rata increase for manganese content over 76 per cent at the rate of 0.1 cent per 1 per cent contained manganese.

The new base prices for silicomanganese are 10.1 cents per pound of alloy for the 3 per cent carbon grade; 10.3 cents for 2 per cent carbon; and 10.6 cents for 1.5 per cent carbon.

Prices on briqueted ferromanganese and silicomanganese are also decreased: Ferromanganese briquets are now quoted 12.30 cents per pound of briquet, and silicomanganese 13.10 cents per pound.

A charge for nonreturnable pallet boxes has been established at the rate of $4 per net ton in 3000 lb boxes and $5.40 per net ton in 2000 lb boxes. Packaging in 50 lb paper bags is available at $11 a ton. There are no changes in other applicable extras. A new size Syntron feeder (¼ x 3 in.) is being introduced. Prices are f.o.b. Rockwood, Tenn., or Houston, on the lump and crushed alloys. On briqueted alloys, full freight is allowed.

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WARD

For Countless Uses of

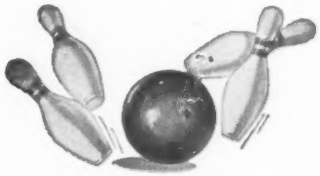
SPRING STEEL

AMERICA'S LEADING SUPPLIER

Where SERVICE and QUALITY is the rule

WARD STEEL CO.

Boston—Cambridge, Mass.
Chicago, Ill.—Greensboro, N. C.



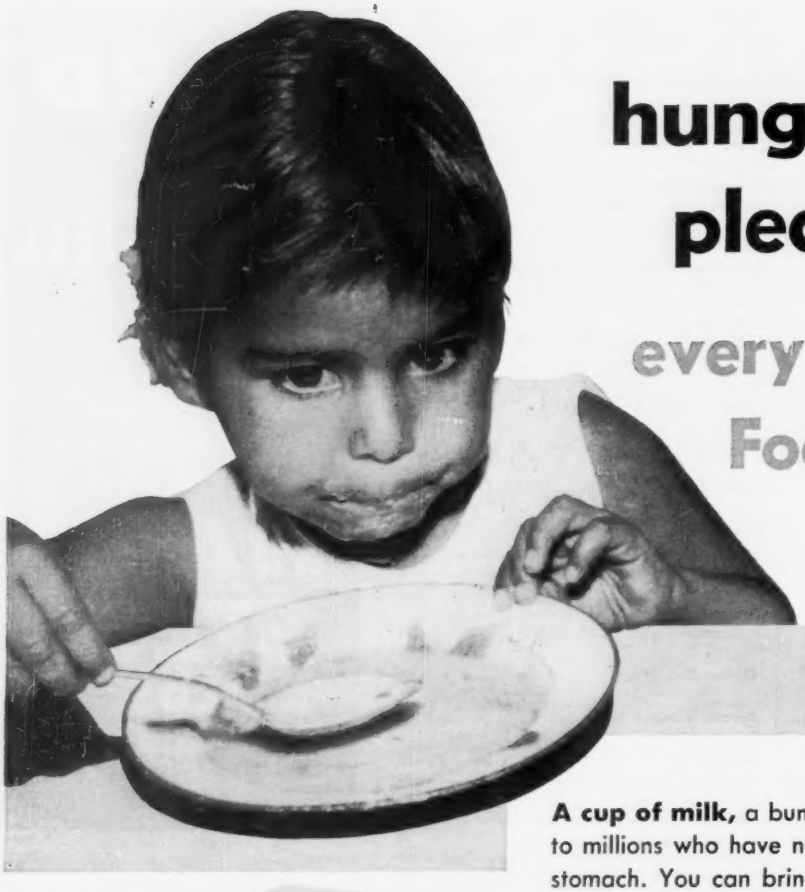
You spent $450,000,000 on bowling last year

13½ times as much as you gave to fight cancer

Shocking? Yes. And here's another shocking fact: in 1961, cancer will strike in approximately two out of three homes.

Go bowling. It's fun. Enjoy yourself. But when you spend fifty cents to knock down pins—give as much to the American Cancer Society—*to knock out cancer.*

If you do that, you will be giving $450,000,000 to fight cancer this year. *Thirteen and a half times as much as last year!* Fight cancer with a checkup—and a check to the **American Cancer Society.**



hunger hurts... please CARE

every $1 sends a Food Crusade Package

A cup of milk, a bun, a bowl of rice can be a feast to millions who have never known the luxury of a full stomach. You can bring the nourishment they so desperately need, and new life and hope, by joining CARE's Food Crusade.

A dollar bill is all it takes to deliver a complete package. Contents are mainly flour, corn meal, beans and powdered milk from America's farm abundance, donated by our Government after it fills welfare requirements inside the U.S. But CARE adds food from other sources, to balance diets, meet individual country needs.

A message of friendship from you and America goes with every package. Your name and address — or that of your group — accompany all the deliveries you make possible. In orphanages, refugee camps, disaster areas, hospitals, schools and poverty-stricken homes, recipients of your kindness will know that you, a friend in a far-off land, cared enough to ease their suffering.

Food Crusade packages may not be sent to specific individuals or addresses, but you may select any of these destinations:

Afghanistan	**Hong Kong**	**Pakistan**
Colombia	**Iran**	**Poland**
Ecuador	**Israel**	**Turkey**
Berlin	**Italy**	**Vietnam**
Greece	**Jordan**	**Yugoslavia**
Haiti	**Korea**	

CARE, 660 First Ave., New York 16, N.Y.

Here is $..... to send Food Crusade packages to the needy. (Make checks payable to CARE, Inc.)

Name.....

Address.....

City.....Zone.....State.....

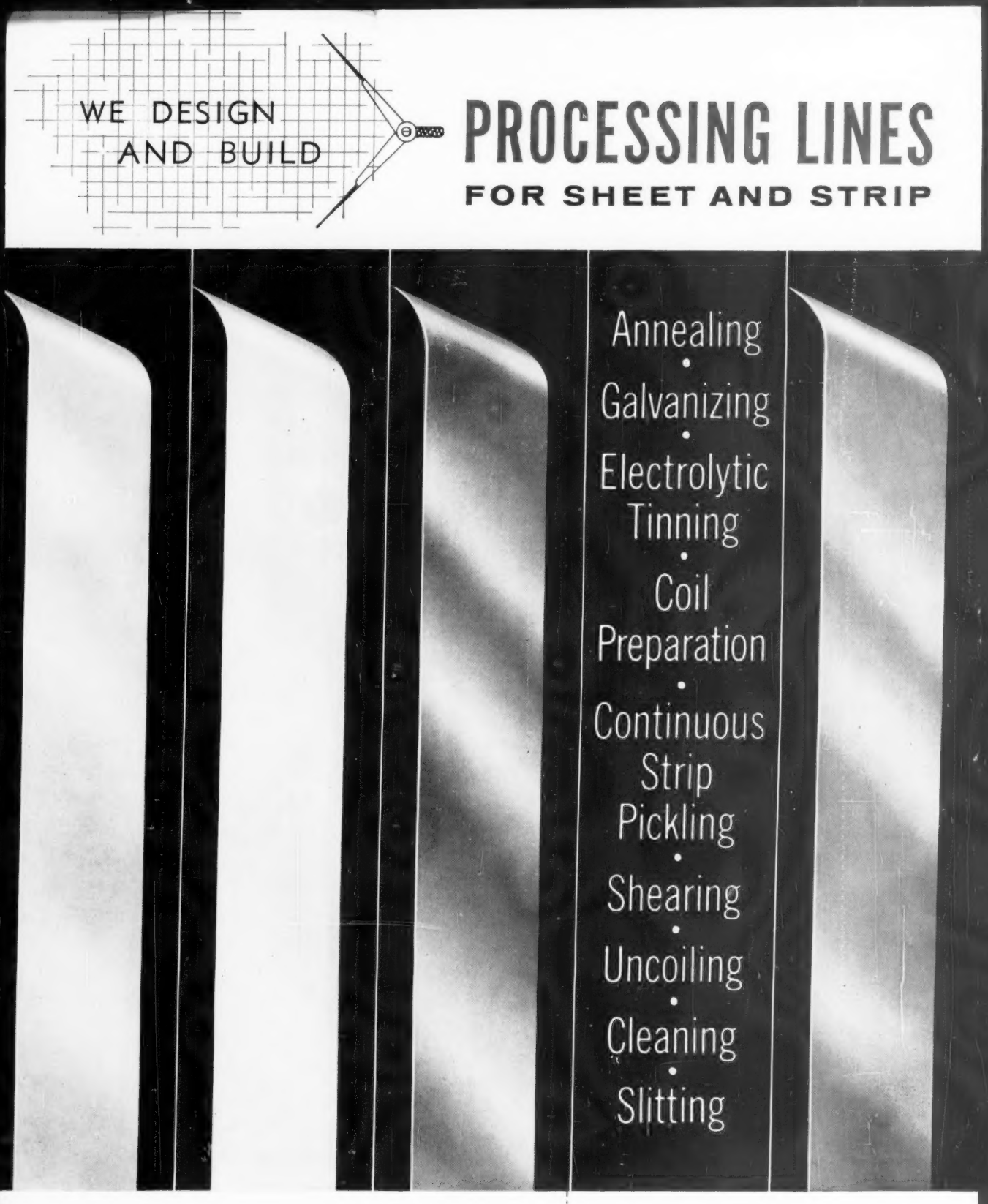
☐ CARE to choose country; or

☐ I prefer .....

Contributions to CARE's Food Crusade are income-tax deductible (Federal).

$1...$10...$100 helps so much

SEND WHAT YOU CAN NOW

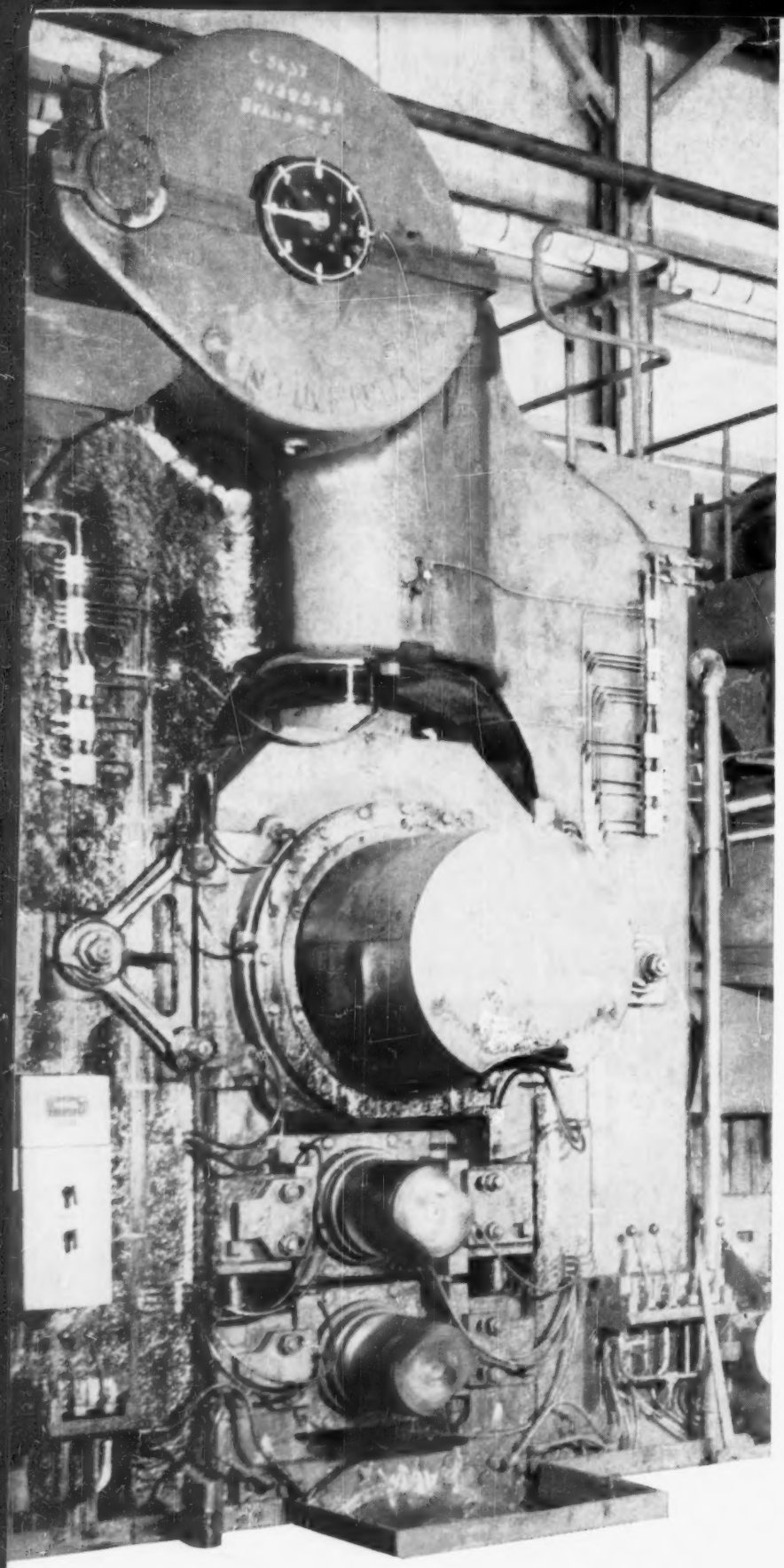


Sheet and Strip Sales
300 Sixth Avenue
Pittsburgh 22, Pennsylvania

BLAW-KNOX

Aetna-Standard Division

BLAW-KNOX

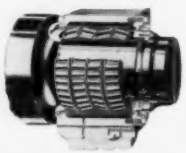


ARMCO specifies tapered roller bearings for their hot strip mill back-up rolls

Armco's 25″ & 54″ x 58″ five stand tandem hot strip mill installed in 1955 at their Butler, Pa., plant has operated without the loss of a single tapered roller back-up roll bearing. And operating expenses have been low on lubrication system maintenance and cost of lubricant. Mill downtime due to failure of bearings and lubricating system is non-existent.

Along with economy, tapered roller bearing equipped back-up rolls have provided a number of other positive benefits. They maintain positive roll location and there is minimum slippage and wear on mill rolls because of lower starting torque. Tapered roller bearings provide higher momentary overload capacity.

For the most in bearing performance and engineering service when you buy or build a mill, specify Timken® bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.



Industry rolls on

TIMKEN®

tapered roller bearings